THE INDUSTRY'S RECOGNIZED AUTHORITY

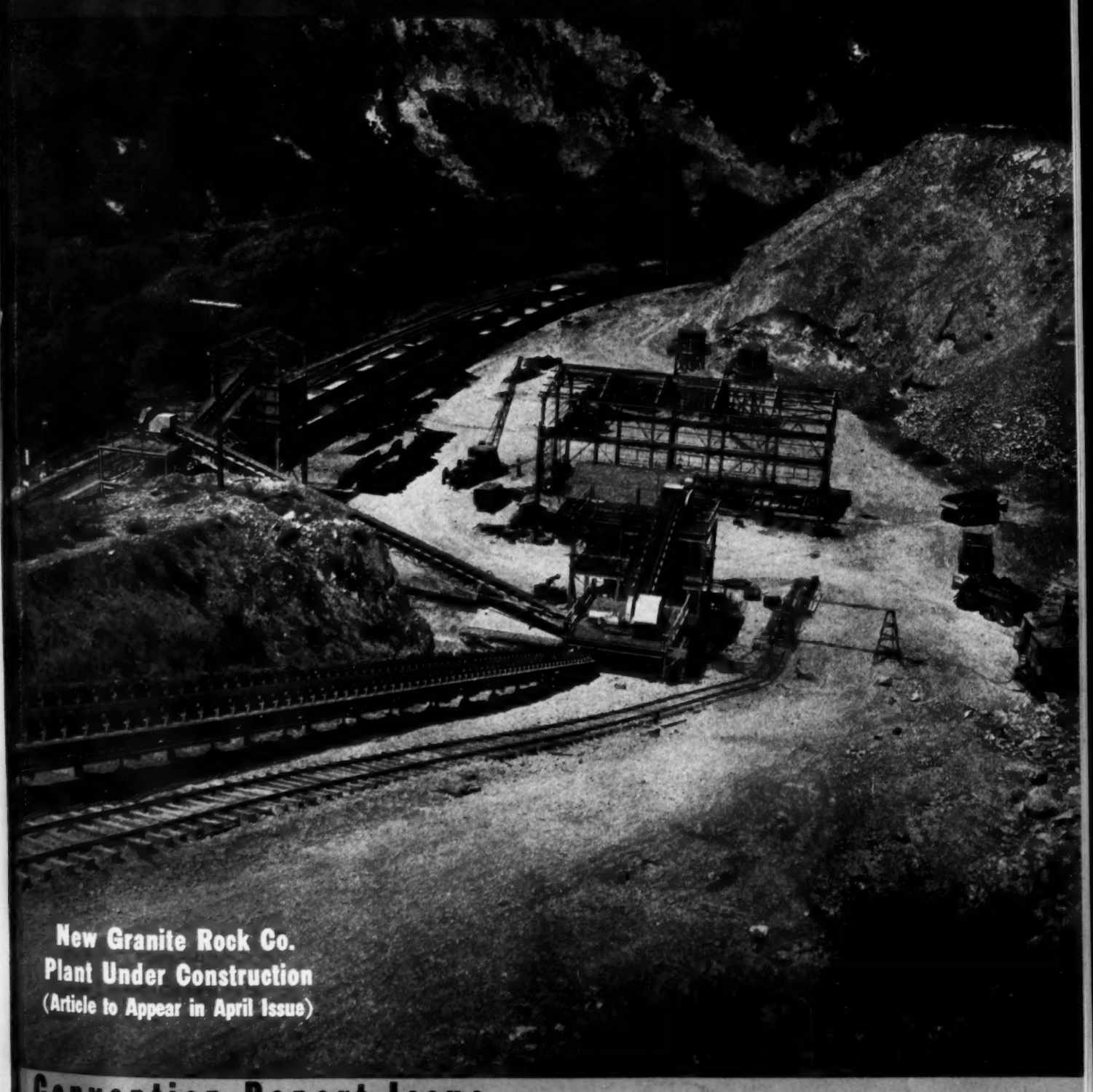
ENGINEERING LIBRARY

# ROCK PRODUCTS

MAR 25 1947

LARGEST NET PAID CIRCULATION IN THE FIELD

MARCH 1947

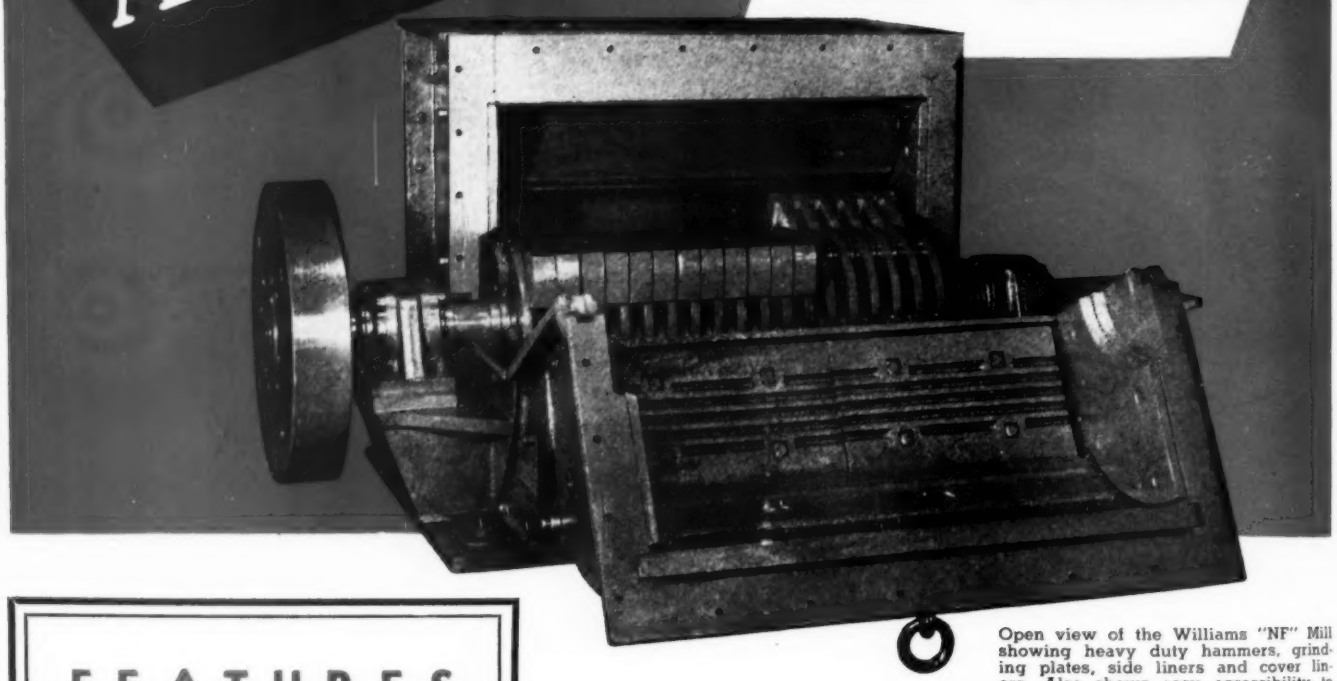


New Granite Rock Co.
Plant Under Construction
(Article to Appear in April Issue)

**Convention Report Issue**
**Crushed Stone; Agricultural Limestone; Canadian Meetings**

# DESIGNED ESPECIALLY FOR AGSTONE

## WILLIAMS "NF" HAMMER CRUSHER



Open view of the Williams "NF" Mill showing heavy duty hammers, grinding plates, side liners and cover liners. Also shows easy accessibility to mill for repairs, etc.

## FEATURES OF THE "NF"

- Adjustable grinding plate.
- Hammers adjustable to overcome wear.
- Larger capacities.
- Lifetime construction.
- 2" top liners, 1" side liners.
- Easy to work on—hinged cover.

The Wiliams "NF" Hammer Crusher was designed especially for reducing 4" or smaller stone to ¾", ½" or agricultural limestone. Embodies all the outstanding features Williams has developed in hammer mill design and construction and has proved itself an outstanding performer in the field.

The "NF" is built in a large range of sizes with capacities from 9 to 35 tons per hour when making agricultural limestone, affording a size mill for any job. Its principles of operation—a combination of crushing and grinding—enables it to make agstone that meets rigid size specifications at a good margin of profit to producers.

*"We appreciate your inquiries—write today for additional information—no obligation on your part."*

**WILLIAMS PATENT CRUSHER & PULVERIZER COMPANY**

800 ST. LOUIS AVENUE

ST. LOUIS, MO.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

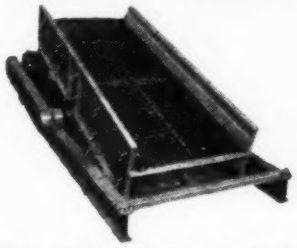
**Williams**

PATENT CRUSHERS GRINDERS SHREDDERS

# LINK-BELT PREPARATION UNITS

## *for higher efficiency—lower production costs*

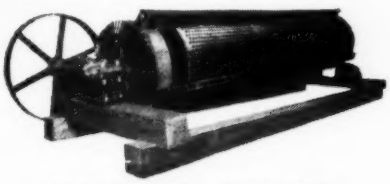
### VIBRATING SCREENS



Link-Belt builds all types and sizes of vibrating screens for sand-gravel-stone and other non-metallics.

### CONICAL WASHING SCREENS

For screening and scrubbing with low operating and maintenance cost.



### REVOLVING SCREENS

Available in a wide range of sizes and capacities — plates with one or several sizes of perforations.

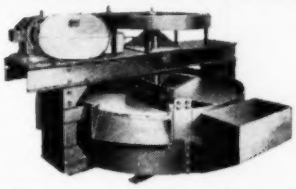
### SCRUBBERS

In combination with screens, Link-Belt scrubbers offer efficient and low-cost cleaning.

### SHAW SAND CLASSIFIERS

For cleaning and classifying sand. Will also make such special grades as asphalt, filter, engine, gypsum and glass sand.

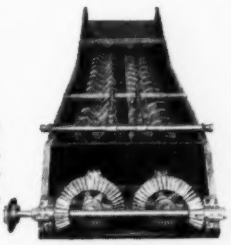
### DEWATERING ROTOSCOOP



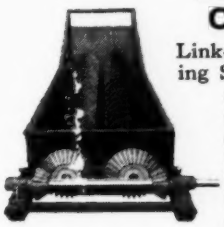
An efficient, compact, self-contained dewatering unit for all types of sand.

### LOG AND SCREW WASHERS

A number of types of Link-Belt washers for gravel and stone are available.



### DEWATERING CONVEYORS



Link-Belt Dewatering Screw Conveyor available in either single or double screw units. Link-Belt Dewatering Flight Conveyors are also available.

• The stringent specifications for sand, gravel, and stone require accurate separations. With the tremendous demand for construction materials, it is important that you have the most efficient and lowest-cost equipment.

Let us talk over your problem, whether you are interested in a new plant or equipment for modernization of present layout.

**LINK-BELT COMPANY**

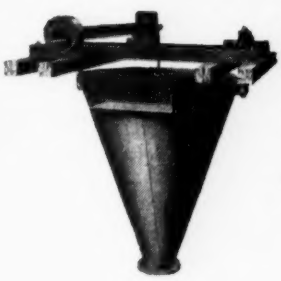
Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.

Offices in Principal Cities. 10,568

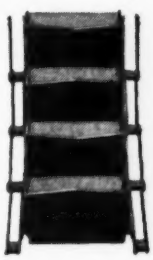
### BELT CONVEYORS

Link-Belt belt conveyors have long been known for high performance and low-cost operation. We also manufacture all accessories such as trippers, belts, pulleys, bearings, take-ups, etc.

### SAND SEPARATORS



Automatic conical sand separators for practical, low-cost, thoroughly reliable separation.

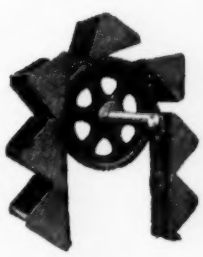


### DIGGING ELEVATORS

A low-cost method of picking up sand and gravel from primary sump. Designed for long wear.

### BUCKET ELEVATORS

Available in many types to suit various service requirements.



### FEEDERS

Link-Belt feeders are made in the apron, belt, grizzly and reciprocating types.

**LINK-BELT**

**SAND AND GRAVEL HANDLING AND PREPARATION EQUIPMENT**

MARCH, 1947

# ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 50, No. 3

**Bror Nordberg**
*Editor*

**Stanley A. Phillips**
*Manager*

**Nathan C. Rockwood**
*Editorial Consultant*

## This Month

**We Hear** 41-42

**How to Get Worker Cooperation**
*Bror Nordberg* 51

**Rocky's Notes**
*Nathan C. Rockwood* 53

**Association News** 55

**The Personal Side of the News** 57

**News of the Industry** 61

**Hints and Helps** 64

**New Machinery** 86

**Labor Relation Trends**
*Nathan C. Rockwood* 68

**Instrumentation and Control of the Vertical Kiln**
*Victor J. Azbe* 69

**Long Kiln Saves Fuel — Improves Clinker**
Lawrence Portland Cement Co., converts two short kilns into single rotary 356-ft. long, securing more uniform product *Bror Nordberg* 70

**Two Men Operate Crushing Plant**
Radcliff & Berry, Inc., operate crushed stone plant having three stations with closed circuit flow from screens to crushers 74

**Operating Session Spotlights Convention**
National Crushed Stone Association convention in Chicago draws a large attendance. Delayed action blasting, crushing problems, dust control, bituminous mixtures, and state specifications top convention interest 76

**Agricultural Limestone Division, N. C. S. A., Convention**
Big program of promotional activities announced for coming year. Government officials point to continuing large market but stress need to sell the farmer 86

**Canadian Mining Institute Meeting** 88

**Phosphate Concentration**
Part 6: New flotation methods permit profitable concentration of low grade sands *James A. Barr, Jr.* 89

**The Problem of Proportioning Portland Cement Raw Mixtures**
Part III: Application to Typical Processes *L. A. Dahl* 92

**Plant Layout for Economical Operation**
Hoke Concrete Works, Raeford, N. C., designs new plant with long tunnel belt conveyor to haul cinders into the plant *H. E. Swanson* 129

**National Concrete Masonry Association Convention**
Largest attendance on record at meetings and exhibit held in Chicago at the Sherman Hotel. Sectional meetings of lightweight and heavyweight aggregates, curing problem draw wide interest 132

**Automatic Bin Controls**
Triangle Certified Concrete Co., Inc., builds new ready-mixed concrete plant to serve growing market *W. B. Lenhart* 139

**The Design of Concrete Mixes**
Part 5: The arithmetic of design for quality and economy *R. E. Robb* 140

**Wisconsin Meeting Stresses Importance of Producing a Quality Product** 143

**Ralph S. Torgerson,** Managing Editor
**W. B. Lenhart,** Associate Editor
**M. K. Smith,** Assistant Editor

***Contributing Editors***

**Victor J. Azbe**
**Dr. F. O. Anderegg**
**M. W. Loving**
**James A. Barr, Jr.**

**H. M. Goodenow,** Dir. of Circulation
**C. P. Teats,** Field Representative
**M. A. Cotter,** Circulation Service
**D. J. Devonald,** Display Adv. Service
**R. P. Keine,** Classified Adv. Service
**Thornell Barnes,** Director of Research
**Milton M. Myers,** Art Director
**C. M. Hancock,** Production Manager

***District Offices***

**Eastern Area**—E. H. St. Jules, Manager; John F. Lockitt, Assistant, 522 Fifth Ave., New York 18, Tel. Murray Hill 2-7888.

**Central Area**—F. S. Ruggles, Manager, Hanna Bldg., Cleveland 15, Tel. Main 4362.

**Midwest Area**—M. B. Nylund, Manager, 309 W. Jackson Blvd., Chicago 6, Tel. Harrison 7890.

**Western Area**—L. C. Thaon, Manager, 309 West Jackson Blvd., Chicago 6, Tel. Harrison 7890.

**Pacific Area**—Duncan Scott & Co., Mills Bldg., San Francisco 4, Tel. Garfield 7950. In Los Angeles 13, 408 Pershing Square Bldg., Tel. Michigan 6203.

**London, England**—Ernest R. Gauley, Managing Director, Maclean-Hunter, Ltd., Sun Life of Canada Bldg., Trafalgar Square, London, S. W. I.

**ROCK PRODUCTS is published monthly by MACLEAN-HUNTER Publishing Corporation, 309 West Jackson Blvd., Chicago 6, Illinois; Horace T. Hunter, President; John R. Thompson, Vice President; J. L. Frazier, Secretary.** Copyright, 1946. Entered as second-class matter, Jan. 30, 1936, at the Chicago, Ill. post office under the act of Mar. 3, 1879. Additional entry at Milwaukee, Wis.

**SUBSCRIPTION INFORMATION**

**Subscription Price: United States and Possessions, Canada, one year, $2.00; two years, $3.00; three years, $4.00. Pan American, one year, $4.00; two years, $7.00; three years $10.00. All other foreign, one year, $6.00; two years, $12.00; three years, $15.00. Twenty-five cents for single copies. Indexed in the Industrial Arts Index.**
**Canadian subscriptions and remittances may be sent in Canadian funds to ROCK PRODUCTS, P. O. Box 100, Terminal "A," Toronto, Canada.**

**To Subscribers — Date on wrapper indicates issue with which your subscription expires... In writing to have address changed, give old as well as new address.**

# "WE HEAR..."

March 1, 1947

Lack of skilled craftsmen rather than a scarcity of materials may be the nation's real construction bottleneck. With this in mind, the National Housing Agency believes that 200,000 building trades apprentices are necessary to handle a $15,000,000,000 construction program.

* * * * * * * * * * *

During 1947, the District of Columbia will have $8,310,000 available for construction and maintenance, as compared with the $5,367,000 expended in 1946.

* * * * * * * * * * *

The Federal Works Agency, headed by Maj. Gen. Philip B. Fleming, is seeking funds for advance planning of a public works program as a back-log to fight the "next depression." The FWA has blueprints on the shelf for slightly under two billion dollars of federal public works and over three billion dollars for state and local projects. General Fleming wants the reserve of planned construction boosted to a minimum of five billion dollars.

* * * * * * * * * * *

The War Department has authorized the U. S. Army Engineers to initiate the 1947 fiscal year army construction program for the continental United States at a total estimated cost of $60,069,752. Housing will account for $41,329,500 of the total.

* * * * * * * * * * *

If a business is purchased, the buyer cannot refuse to employ a veteran who had been employed by the company when he entered the service. A federal district court recently ordered one employer to reinstate with back pay a veteran who had worked for his mother before she sold her business. The court decided that the purchaser of the business, and not the veteran's mother was responsible for the job.

* * * * * * * * * * *

Department of Commerce estimates place total construction volume for 1947 at $22,000,000. Private industry now is doing nearly 80 per cent of all construction, which this year will amount to $15,000,000,000. Housing will account for about 40 per cent of the 1947 construction schedule.

* * * * * * * * * * *

West Virginia State Road Commission announced that total expenditures by the engineering division in 1946 amounted to $21,000,000, with $8,100,000 for construction and $11,500,000 for maintenance. The total available in 1947 is $30,000,000.

* * * * * * * * * * *

A freight car famine is knocking production schedules throughout industry into a cocked hat. Quite a number of lime plants with a tremendous back-log of orders have had to suspend production for several days at a time. Industrial sand producers also are feeling the pinch. Coal companies also have reported reduced production due to a lack of cars. One cement company spokesman of a large eastern plant said that a request for 20 cars a day has resulted in the delivery of only two. While this situation is gradually deteriorating, the Office of Defense Transportation and the Office of Temporary Controls in Washington are disputing whether car-builders should get enough steel to build 10,000 or just 7000 cars a month. Reports are current that there is inefficiency on the part of railroads in moving cars and in switching. Pacific Coast shippers seem to be in better shape than any other part of the country.

## WE HEAR

During 1946, North Carolina paved more miles of roads and expended more money on its 60,000 miles of state and county highways than in any previous year in the 25-year history of the State Highway and Public Works Commission. The commission paved, stabilized or let contracts for paving a total of 12,094 miles of roads estimated to cost $32,622,911.

* * * * * * * * * * *

Pennsylvania highway costs have practically doubled since 1940. Labor is the principal item of increase, rising from an average hourly rate in 1940 of $0.493 to $1.234 in 1945. Multiple pay for overtime also is a contributing factor in the higher costs.

* * * * * * * * * * *

Illinois Department of Public Works and Buildings for 1946 records show that the low bids were 105.75 per cent of the engineer's estimates. During the year low bids for highway construction amounting to $6,750,000 were rejected, approximately 30 per cent of the total. Illinois is no longer using thickened edges for its portland-cement concrete highway pavement. Current costs of 9-in. uniform thickness concrete pavement are 44.1 per cent higher than they were in 1940.

* * * * * * * * * * *

Texas completed one of the largest secondary road projects in its history during 1946. It covered 150 projects calling for the construction of 1230 miles of land service roads.

* * * * * * * * * * *

Construction contracts awarded in the United States for the week ending February 13 totaled $54,778,000. According to Engineering News-Record, this was 51 per cent below the previous week but 24 per cent above a year ago. Private construction for this week was $33,566,000 or 57 per cent less than the previous week and 24 per cent above the corresponding 1946 week. Public construction was $21,212,000 or 37 per cent below the previous week and 25 per cent more than in the 1946 week. For the seven weeks this year, the cumulative total of engineering construction was $597,000,000.

* * * * * * * * * * *

Fred G. Healy, construction engineer of the New Mexico highway department, has been given a special assignment as urban engineer in charge of advance engineering studies and surveys in connection with urban highway projects. He will cooperate with urban engineers of the Federal Public Roads Administration.

* * * * * * * * * * *

A voluntary arbitration agreement has been signed by the Associated General Contractors of America, Inc., and the Building and Construction Trades Department of the American Federation of Labor, providing for machinery for handling on a national scale employer-union disputes affecting the construction industry through arbitration boards whose decisions will be binding on disputants. Apparently the lathers union in New York has not heard about the new boards.

* * * * * * * * * * *

President Truman's annual budget message reveals that the new Congress will act on requests for an appropriation of about $1,400,000,000 for construction and planning during the fiscal year of 1948, which begins July 1, this year. The biggest slice of the construction funds would be reserved for the Public Roads Administration with a total of $300,288,854. This money would be spent as follows: federal aid under Highway Act of 1944, $279,000,000; grade crossing elimination, $5,000,000; secondary roads, $3,000,000; highways on public lands, $3,000,000. The Army Engineers would be allotted $291,600,000. The Bureau of Reclamation is awarded $130,942,000 for construction.

* * * * * * * * * * *

Underground steam lines in Birmingham, Ala., are laid in a new way. A slab of concrete 4 to 5 in. thick is poured in the bottom of the trench, and conventional hollow tile is placed atop the concrete to form the sides of the trench. The insulated steam line is then placed, and covered with the channel pipe, which is grouted firmly to the tile with mortar. Why not concrete pipe?

The Editors

# ★ ★ ★ Editor's Page

## How to Get Worker Cooperation

OUR heading for this page was the subject of an address delivered before the thirtieth annual convention of the National Crushed Stone Association by Whiting Williams, industrial consultant of Cleveland. Mr. Williams' presentation was a down-to-earth, man to man kind of talk, free from high-sounding phrases that mean nothing and which are rarely understood by the audience (and not too often by the speaker) in most of the prepared speeches heard on the subject.

His philosophy deserves earnest contemplation; for Mr. Williams has spent many years living and laboring together with workers precisely to find out for himself what is uppermost in their minds and what they expect from management. And it isn't only high wages.

### Wages Not Enough

There are some fundamentals to sound management, which have *definite* tools for accomplishment, as pointed out by Mr. Williams, and without which worker cooperation can never be achieved. They have nothing to do with the passage of laws which, in themselves, cannot bring about increased productivity of labor as we all should know.

The time is now more favorable than it has been in years for management to renew its effort to rediscover its individual employee and to do this, to use the words of Mr. Williams, the fears, hopes and prides of workers must be kept uppermost in mind. The kind of fear to be allayed is that relating to loss of standing, self-respect and the right of the worker to believe in himself, more than fear of loss of income per se.

Employees who have no fears in relation to their jobs have very live hopes for personal advancement or promotion, and it is up to each individual employer to provide that opportunity. Every worker, in fact everyone, has pride that reflects in the intensity of his fears and hopes and, again using Mr. Williams' language for emphasis, "nobody can believe in himself and his importance and enjoy his self-respect apart from his job . . . workers want to take pride in their jobs simply because, if they cannot, they cannot take pride in themselves; and if they cannot take pride in themselves, then life isn't worth living."

These factors—fear, hope, pride—are elementary considerations but they are ever present and they are not intangible. Any employer can ask himself how he stands in relation to allaying fears, offering opportunity and in helping to instill and maintain self-respect in his workers. More explanation, information and contact are the means of attainment.

Workers want to be consulted oftener by management before the company gets into something new that affects them. They believe they have knowledge and experience to contribute and want to be taken more into the confidence of their superiors—as a matter of pride. Men just want to know where they stand.

In the words of Whiting Williams, management must tighten up, first to make certain that the fears, hopes and pride are taken care of with their foremen and then to help the foremen, with example and training, to do the same with the men they supervise.

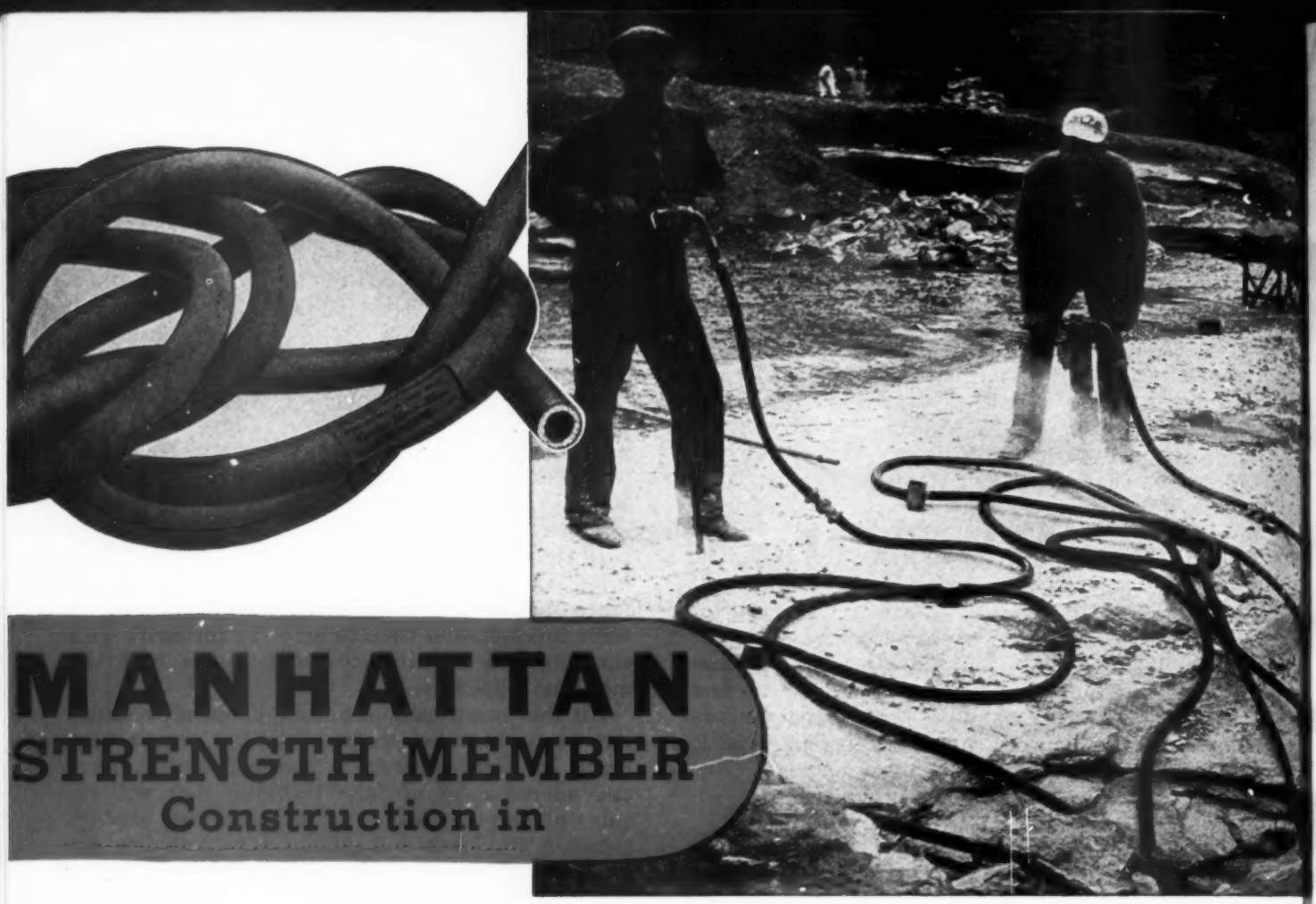
All this is not easy of accomplishment, because irresponsible union leaders and the government itself, by their actions in the last decade, have engendered a lot of false thinking that will require much explanation, information and contact between employer and employee in order to get at those fears, hopes and prides. Employers have lost confidence in themselves and have lost faith in their employees; because concerted efforts have been made to sell the worker on the idea that all concerns make tremendous profits, and because great pressure has been brought to convince the public that industry and business are not to be trusted.

### More Favorable Conditions

Recent developments—the election and the bad repute that unions have gained with the public—should make it clear to employers that their union dealings are not the all-important consideration. Conditions are now more favorable for insistence that those union obligations be accompanied by increased effort to rediscover the worker through personal contact and closer dealings with him all around. Unions have performed a service in affording some job protection, to be sure, but have been disappointing insofar as they have provided any hope for promotion.

With a change from a seller's market to a buyers' market, we enter a period much more healthy for labor and management to go forward together. There is a very real opportunity now to get the cooperation of workers, if the employer will recognize that the worker has lost his sense of importance, and that action must be initiated to reinstate his confidence. But it cannot be done through wage increases alone. Think it over.

Bror Nordberg



# MANHATTAN STRENGTH MEMBER Construction in

# Condor HOMO-FLEX HOSE

## Has these 10 ADVANTAGES

- Extreme flexibility - easy to handle
  - Resists kinking
  - Light in weight
- Practically inseparable cover and plies—balanced homogeneous construction
- Withstands high pressures and surges with wide margin of safety
  - Uniform inside diameter
- Less elongation and expansion
  - Less fatigue to operator
  - More production
  - Lower ultimate cost

An outstanding Manhattan development in hose construction makes Homo-Flex a lighter, more flexible, longer lasting hose in every service for which it is styled. The coiled length illustrated shows how easily Homo-Flex will take the turns and twists, as workers whip it around. Homo-Flex hose does not writhe or coil under pressure. Delivers unusually long service, even under the destructive effect of rapid pulsations of pressure due to Manhattan's development of Homo-Flex Strength Member design and construction. Flexlastics throughout—plus Turnate Vulcanization—insures longer resistance to natural wear.

Men prefer Homo-Flex because it's a quicker, easier-handling, energy-saving hose—"de-bulked," yet strengthened and streamlined for modern methods.

**Homo-Flex Hose styles for**

Air, Air-Oil, Water, Steam Pressing Iron, Orchard Spray, Oil Spray, High Pressure Mine Spray, Butane Propane for Tank Truck Deliveries

The term FLEXLASTICS is an exclusive MANHATTAN trade mark. Only MANHATTAN may make FLEXLASTICS.

RAYBESTOS R M MANHATTAN

# RAYBESTOS-MANHATTAN, IN

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES PASSAIC, NEW JERS

# Rocky's NOTES

Nathan C. Rockwood

## Signs of the Times

AS AN INTERESTED READER of the summary of opinions on the immediate future of the industry in our January issue, I was struck by the similarity to those published in January, 1921—26 years ago. History may or may not repeat but there are certainly economic cycles.

And, after all, economic conditions or factors are not something to be theorized about by professors of economics, but are the vital concern of everyone who is trying to make a living. If the government economists would content themselves with plain statements as to what are the changing economic factors, and refrain from attempting to suggest political cures, their services would be more appreciated and be held in higher esteem by businessmen. The *Wall Street Journal*, in a recent editorial, has likened genuine economic forecasts to weather forecasts—for the wise to take notice and if convinced to act accordingly. However, the government never can compel individuals to carry umbrellas or to take heed of hurricane warnings; and, of course, the Weather Bureau recognizes that its forecasts may not always be right. "If the Government should make any record of reasonably accurate economic forecasting," says the editorial, "would it be necessary to do anything more than that? Would not the people then have enough confidence in its forecasts to be guided by them? The sum of wise individual action would be likely to be wise policy."

Most of our present production difficulties come from exactly the same kind of factors that controlled the immediate post-war period in 1919; 1920 and 1921. The inflation tendencies were the same, only worse now than then because at the behest of government economists various political moves were made in the present instance to meet predicted deflation and much unemployment. Neither deflation nor widespread unemployment, except that promoted by soldier bonus payments and government inspired strikes, materialized; and the political moves made resulted only in stimulating an inflation already underway.

Probably the best known "law" of economics is that there can never be a long period of high production and sustained inflation, regardless of the amount of easy money in the hands of the public. Even the government economists recognize this, and they are dusting off their previous reports on deflation and urging the President to begin a huge public works program as "a cushion." For the present, at least, the President is said to be confident that such a huge public works program would be unwise.

### Can't Sustain Booms

Judging from the reports of producers in this industry there is now enough business in sight this year to take care of all they can produce without any extravagant *new* public works projects. Both our own industries and all others need to be given a chance to rehabilitate their plants before a new load is thrust upon them.

A flood of just such projects as our government economists wish now to promote resulted in an exceedingly rapid and unhealthy expansion of production in the 1920's, which old-timers have recollections of as "a period of profitless prosperity"—for those who were actually producing real wealth and not speculating in paper certificates supposed to represent wealth. We had a more recent experience in too rapid a rise in optimism in 1936 and 1937, which also showed that the political factor can demoralize business as well as stimulate it.

The U. S. Government has already taken one step to meet predicted deflation, in the midst of present inflation; or so is the argument. The Federal Reserve Board has dropped the 100 per cent margin requirement for stock trading and substituted 75 per cent because, Chairman Eccles says: "The inflation has largely run its course."

We are familiar with the arguments used by bankers and brokers in favor of margin trading—that it results in a larger and faster market for stock holdings, etc. As a stockholder in several corporations, in a very modest way, we appreciate that more active trading, promoted by lower margins, may possibly result in paper profits. However, we bought stocks for investment and have always believed that the 100 per cent margin requirement was a good thing for investors; and according to most commentators the stock market trading of the last few years has been chiefly buying by investors for income.

### Stock Values?

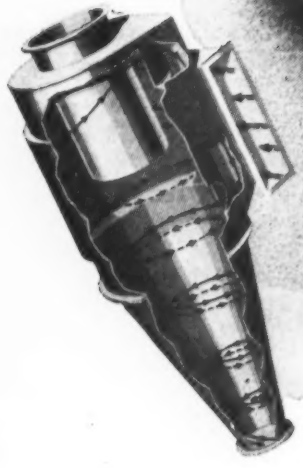
This has resulted in stocks being bought and sold largely on their investment, or shall we say, on their true values rather than their speculative values. It has meant a fairer deal for the stocks of smaller, or less publicized, companies instead of concentrated trading in so-called "blue chip" and speculative stocks. It has discouraged trading by corporation executives on inside information and other reprehensible practices of stock market gambling. To our simple mind stock certificates are intended to raise or transfer capital for investment, and horse racing, poker and other pastimes are more appropriate for gambling without injury to the general public. Hence, we regret this "sign of the times" as a step toward worse inflation; or a faster method of parting suckers from their high wages and savings.

An investigation of employment conditions by the *Wall Street Journal* on its own account is said to show an appreciable shrinkage in job offerings, more eager and less fastidious job seekers, and a tendency of those who hold jobs to make more effort to hold on to them. The journal quotes replies from many employment agencies to prove its point. Even foundry workers are now said to be in plentiful supply in some of the big machinery centers. There are also signs of more demand for unemployment benefit payments, which, however, may be only seasonal. Similar signs heralded the beginning of the 1920's boom and did *not* herald a sustained period of deflation. In other words, people are getting back to earth and ready to give an honest day's work again; not altogether from choice perhaps, but it is not deflation so much as a return of common sense.

A tremendous amount of public works construction unquestionably needs to be done, but old-timers never worried about such a back-log as this in the days when economics was relatively simple and a few rules were well understood. One of these was that so-called "bad years" for general business were good years for public works construction; because (1) public works securities found a ready market at low interest rates when stock market money was tight; (2) workers and materials were available at reasonable prices; (3) there was an over-all saving to the taxpayers. We are glad to see that some of our contributors in the January issue still remember these simple maxims, and therefore see the futility of attempting to establish permanent prosperity by making public works compete with private industry for a temporarily short supply of labor and materials.

*high efficiency*

# DUST COLLECTION



Only Buell Dust Recovery equipment affords these six extra-efficiency features: 1—The "Shave-Off"; 2—Large Diameters; 3—Extra-Sturdy Construction; 4—Correct Hopper Design; 5—Split-Duct Manifolding; 6—Inner Welds Ground Smooth.

Write for Buell's book—"The van Tongeren System of Industrial Dust Recovery".

**BUELL ENGINEERING CO., INC.**
**Suite 5001—70 Pine Street, New York 5, New York**

DESIGNED TO DO A JOB,
NOT JUST TO MEET A "SPEC"

buell

van Tongeren DUST RECOVERY SYSTEMS

# Association NEWS

LABOR LEGISLATION continues to take the spot-light in Congress, and although the immediate threat of portal-to-portal pay suits has largely been dissipated by Judge Picard's latest ruling in the Mt. Clemons case that the time involved was too insignificant to warrant payment for make-ready and walking-to-the job time, industry does not yet feel that it is out of the woods. A House judiciary sub-committee has drawn up a bill (Gwynne, Iowa) under which an employer who could prove he had "acted in good faith" could thereby establish a defense against suits filed for back pay under the portal-to-portal principle. Under the bill an employer would not be liable for payment of back portal pay for more than three years prior to filing the suit. Working time would be considered as that set by usual practices in the industry and by legal collective bargaining in which both parties acted in good faith.

### Testifies Before Senate

Executive Secretary V. P. Ahearn of the National Sand and Gravel Association recently appeared before the United States Senate Committee on Labor and Public Welfare to testify concerning pending labor legislation. Mr. Ahearn expressed opposition to the proposal of Senators Ball, Taft and Smith to set up a new federal mediation board to absorb and enlarge the duties of the conciliation service. "Most employers feel," he said, "there should be no formal and permanent machinery to attempt settlements between unions and management. We believe any form of compulsory arbitration or super machinery for disposition of labor disputes may frustrate rather than foster industrial peace." Mr. Ahearn is of the opinion that if Congress outlaws the closed shop in industry, there will be much confusion as a great many existing labor contracts would have to be renegotiated. He also expressed doubts concerning proposals to forbid industry-wide bargaining, and points out that some industries like that system and want to keep it.

Mr. Ahearn suggests that the Wagner Act be amended to equalize the rights and responsibilities of employers and unions, making its obligations binding on unions as well as employers. He feels it may also be necessary to amend the Norris-LaGuardia anti-injunction law to make it clear that the Government shall never be helpless in a situation threatening the public welfare. Jurisdictional disputes between unions should also be banned when they involve defiance of a finding by the National Labor Relations Board. Secondary boycotts should also be prohibited, he thought.

### Policy Changed with Respect to Lime Association Meetings

The National Lime Association for many years has had its annual convention as an open meeting. This year the Spring Operating Meeting is scheduled for May 7 and 8 at The Homestead, Hot Springs, Va., immediately following the annual meeting, May 5 and 6. By action of the board of directors all future Operating Meetings will be closed except to members of the National Lime Association and those who are invited to participate in the program. Since it would be difficult to have an open convention and a closed operating meeting, this year the annual convention also will be closed. The official announcement concerning this change is as follows:

"At the November 16, 1946, Board of Directors' meeting of the National Lime Association it was decided to close all future Operating Division meetings except to members of the National Lime Association, and only those suppliers and engineers actually participating in the operating sessons, and the trade press."

### Road Builders Meet in Chicago

The American Road Builders Association held its forty-fourth annual convention at the Palmer House, Chicago, February 17 to 20. Many of the papers and addresses were of direct interest and concern to producers of aggregates and cement. Some of the papers and speakers are listed herewith: Concrete Runways, A. A. Anderson, Mgr., Streets and Roads Bureau, Portland Cement Association; Slag-Sand Binder for Airports, E. W. Bauman, secretary, National Slag Association; Use of Clean Granular Materials in Base Courses Under Airport Pavements and Relationship of Subgrade Support to Thickness of Flexible Pavements for Airports, T. A. Middlebrooks, Chief, Soil Mechanics Section, Office of Chief of Engineers; What's Ahead in the Highway Program, Thomas H. MacDonald, Commissioner, Public Roads Administration; Design and Construction of Sub-Bases, F. V. Reagel, engineer of materials, Missouri State Highway Department, C. W. Allen, research engineer, Ohio Department of Highways, and P. E. Masheter, Ohio Department of Highways; Soil-Cement Stabilization as Practices in Columbus, Ga., J. M. Gray, City Engineer, Columbus, Ga.; Trends in Design and Construction of Rigid Type Pavements, A. T. Goldbeck, general chairman, Committee on Design of Rigid Type Pavements and engineering director, National Crushed Stone Association, which was divided into sections with Soils being covered by Tilton E. Shelburne, director of research, Virginia Department of Highways, Concrete Design by E. W. Bauman, secretary, National Slag Association, and Design Features by T. J. Kauer, managing director, Wire Reinforcement Institute.

### Industrial Sand Rates Discussed at Recent Meeting

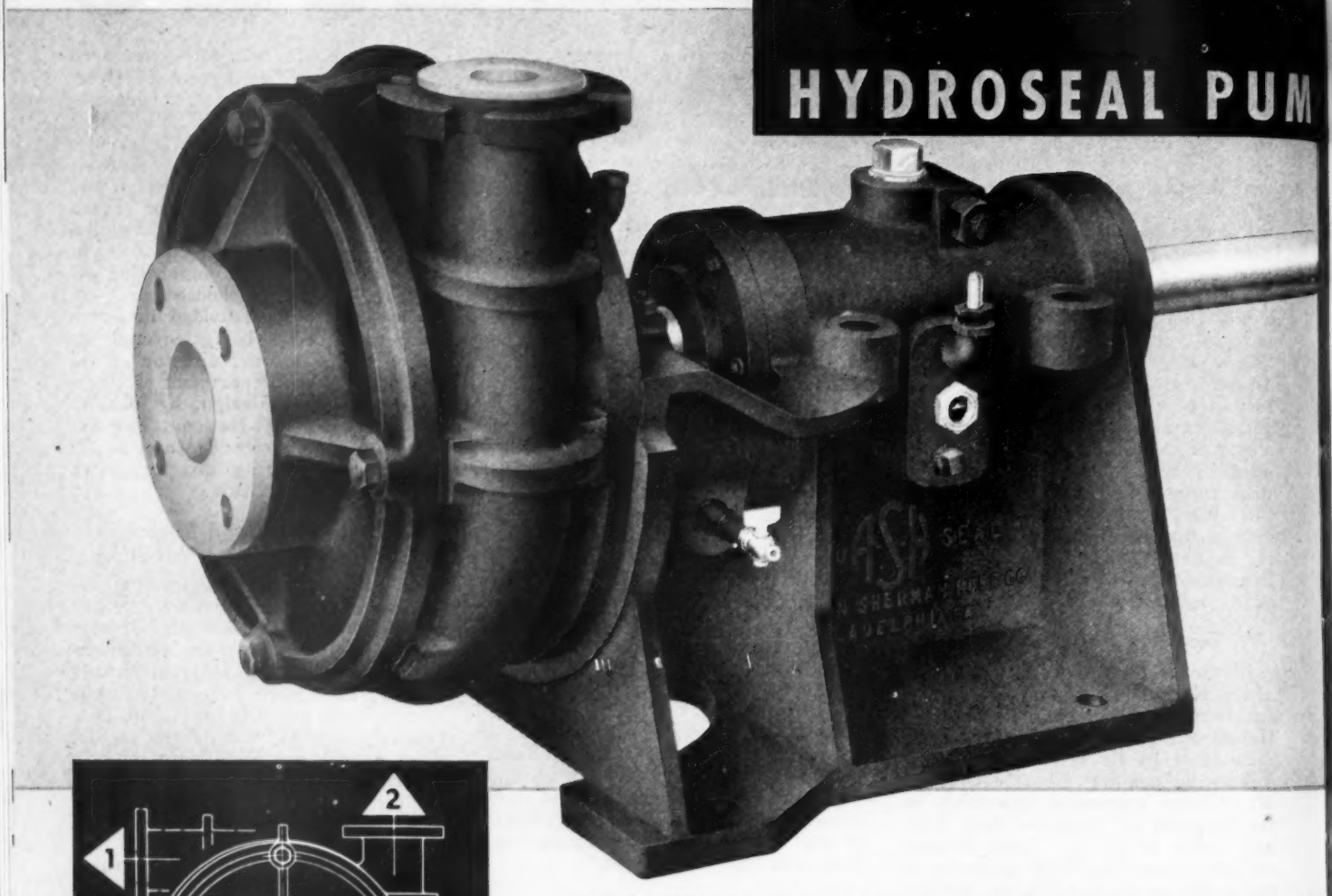
At a meeting of the National Industrial Sand Association on January 31, the question of short-haul freight rates was brought up for consideration. From certain shipping points the railroads have had specific commodity rates on industrial sand, particularly molding sand, equal to the rates on common sand from pits in the same general locality that have shipped common sand to consignees who used it for industrial purposes, particularly foundry use. This adjustment of the moulding sand rates to the common sand basis has been made voluntarily by the carriers in recognition of their competitive use. Such rates have generally applied only for hauls up to about 200 miles. By the recent increases under Ex Parte 162, the common sand rates are increased 15¢, whereas the industrial sand rates are increased 20 per cent, maximum 30¢, thus destroying the parity in all rates over 75¢, to the detriment of the industrial sand shipper. Executive Secretary V. P. Ahearn points out that since the specific commodity rates equalizing industrial sand with common sand prior to the Ex Parte 162 advances were published voluntarily in the first instance, the carriers have the same reason now to waive so much of the Ex Parte 162 increase on industrial as exceeds the common sand increase. To do so, however, requires publication of new commodity tariffs taking the increase out from under the so-called blanket or stretcher supplement that refers to all existing tariffs and rates.

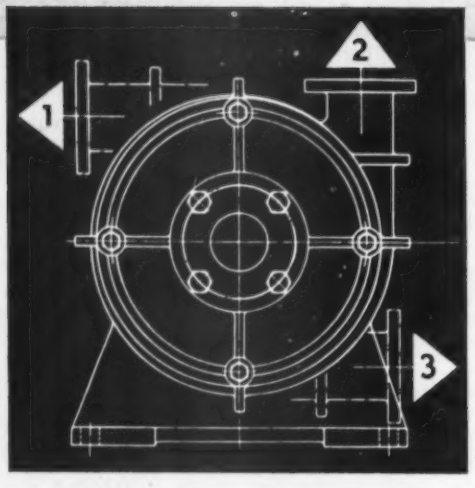
# NOT NEW

***The maintained high efficiency and the low maintenance costs achieved by the Hydroseal Principle and Maximix Rubber Pumping Parts remain the same, because the inside construction of the pump itself is unchanged.***

# NEW

## HYDROSEAL PUM






**NEW BEARINGS** — Heavy duty, anti-friction radial and thrust bearings are now standard on Hydroseal Pumps. These bearings are interchangeable.

**NEW AXIAL ADJUSTMENT** — The pump is now provided with a New, Improved means for easy, two-way axial adjustment of the shaft and bearing assembly.

**NEW PUMP SHELL** — No rigid mounting of pump shell or engine side bell to pump base. Both are now supported from the bearing housing. This permits pump discharge to be placed at any of the three positions indicated at left. In many cases, this will simplify installation of discharge piping; further, it eliminates "special pump" construction to obtain this result.

***Blueprints of the New, Improved Hydroseal Pump will be sent on request, until our New Catalog, now in preparation, is completed.***

# NEW SLURRY PUMP

**A "new type" of seal ring at the stuffing box gland of Hydroseal Slurry Pumps now makes dilution of the solution pumped infinitesimal. Only 15% of the former low amount of sealing water is now required, this saving being obtained without affecting the other operating characteristics of the pump in any way; in fact, the new seal ring can be installed on any Hydroseal Slurry Pump now in use.**

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

*Correspondence from United States and Canada to*

**ALLEN-SHERMAN-HOFF CO., 1435 Locust St., Phila. 2, Pa.**

*Correspondence from anywhere else in the World to*

**A-S-H EXPORT CO., 1435 Locust St., Phila. 2, Pa.**

CABLE ADDRESS: ASH, PHILADELPHIA—BENTLEY'S CODE

# the *Personal Side* of the news

## Quarry Superintendent

KENNETH KINNISON, Kansas City, Mo., has succeeded Frank Snyder as superintendent of the L. W. Hayes quarries in Bethany, Mo. Mr. Snyder has purchased a quarry south of Jameson, Mo., which he is managing.

## Goes to Mexico

EDWILL B. SMITH, formerly chief engineer and operating superintendent of the Davenport, Iowa, plant of

Edwill B. Smith

the Dewey Portland Cement Co., Kansas City, Mo., has been appointed general superintendent of the Cemento Portland Nacional, S. A., at Hermosillo, Sonora, Mexico. Mr. Smith has been with the Dewey Portland Cement Co. since 1919, when he joined the Dewey, Okla., plant as chief engineer in charge of design, construction and maintenance. In 1926 he was transferred to Davenport, Iowa, to take charge of the construction and operation of the Davenport plant.

## Vice-Presidents

CHARLES S. ANDRES, formerly works manager at the Coldwater, Mich., plant of the Wolverine Portland Cement Co., Kalamazoo, Mich., has been appointed vice-president in charge of production, and RICHARD C. STENGER has been promoted from sales manager to vice-president in charge of sales.

## Personnel Changes

H. H. MOORE, secretary-treasurer of the Superior Cement Corp., Portsmouth, Ohio, has been appointed vice-president in charge of all operations except sales which are under the direction of G. K. MITCHELL, vice-president, and supervised by C. P. SHAW, assistant to the vice-president and sales manager. JOHN K. LONG, who has been company auditor for the last three years, was elected treasurer, and GEORGE W. QUILLIN, secretary. E. H. DAVIS, who has been president for seven years, continues in that capacity. Directors of the company are E. H. Davis, G. K. Mitchell, George W. Quillin, P. C. Morris and H. H. Moore.

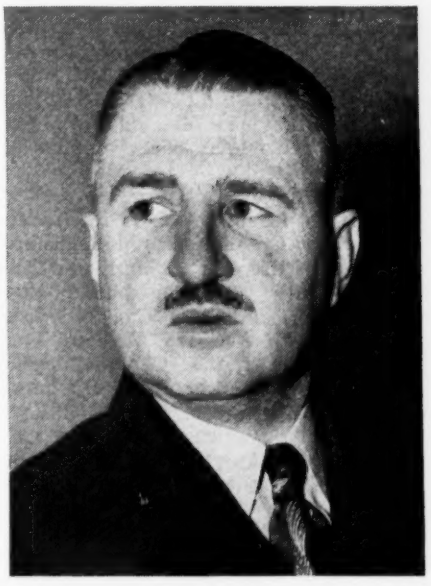
## Chairman of the Board

LEON E. BEEGHLY, president and treasurer of the Federal Portland Cement Co., Buffalo, N. Y., has been elected chairman of the board of directors, and HARRIS N. SNYDER has been named to succeed Mr. Beeghly as president and treasurer. RONALD E. DANIELS has been appointed vice-president and secretary, and W. E. BLISS has been reelected a vice-president. ALBERT A. OESTERLE, superintendent of the cement plant since 1933, has been promoted to the newly created position of general superintendent in charge of all plant operations, including cement and rock wool production. EUGENE C. WILLIAMSON, who has been master mechanic since 1933 and acting superintendent in the absence of Mr. Oesterle, has been named superintendent of the cement plant, and STANLEY J. DRAKE, superintendent of the rock wool plant. FRANK NERTHLING, who has been with the company since 1937 as a repairman and millwright, has been made master mechanic of the cement plant; PAUL DEMUTH, master mechanic of the rock wool plant; and ROBERT C. MASON, JR., credit manager.

Harris N. Snyder

## Joins A.R.B.A.

HARRY E. BLAKELY, Nashville, Tenn., recently discharged as a lieutenant colonel of coast artillery following a six-year tour of duty in the



Harry E. Blakeley

United States Army, has been made managing director, Highway Contractors' Division, American Road Builder's Association, Washington, D. C. He replaces Burton F. Miller who has resigned to become executive secretary of the Michigan Road Builders' Association, Lansing, Mich.

## New Officers

ALFRED J. MILLER, president of Whitehead Brothers Co., New York, N. Y., has been elected chairman of the board, and ANDREW Y. GREGORY has been named president. CHRISTIAN MATHIESEN has been appointed vice-president; JAMES H. WHITEHEAD, vice-president and secretary; C. CHARLES MCKAY, assistant secretary; EARNEST C. LASS, treasurer; and TIMOTHY F. O'LEARY, assistant treasurer.

## Chief Chemist Retires

W. MARSHALL SMITH, Alpena, Mich., has retired as chief chemist of the Huron Portland Cement Co., Detroit, Mich., after 39 years of service. ALBERT C. FOWLER has been appointed to succeed Mr. Smith as chief chemist.

## President Resigns

CLARENCE E. EHLE has resigned as president and director of the Indiana Limestone Co., Inc., Bedford, Ind., and Lee E. Donaldson, president from 1936 to 1943, has rejoined the company as vice-president in charge of sales and stone production.

## Agricultural Limestone Division Directors

AT the recent convention of the Agricultural Limestone Division, National Crushed Stone Association, the following were elected to the Board:

New members of the Board of Directors are Ralph Nolan, Nolan Stone Co., Rome, N. Y. (Northeast Region); W. L. Bryan, Bryan Construction Co., Northfield, Minn. (North Central Region); and John H. Riddle, Riddle Quarries, Inc., Marion, Kans. (Western Region). The balance of the Board (exclusive of officers) includes: Northeast Region: H. E. Batten, Jr., Callanan Road Improvement Co., South Bethlehem, N. Y.; Paul I. Detwiler, New Enterprise Stone and Lime Co., New Enterprise, Penn.; and Ellwood Gilbert (vice-chairman), New Castle Lime and Stone Co., New Castle, Penn. East Central Region; Earl L. Dingle, Harry T. Campbell Sons' Corp., Towson, Md.; S. B. Downing, Jr., Central Rock Co., Lexington, Ky.; R. P. Immel, American Limestone Co., Knoxville, Tenn.; A. W. McThenia, Acme Limestone Co., Fort Spring, W. Va.; W. T. Ragland, Superior Stone Co., Raleigh, N. C.; A. B. Rodes, Franklin Limestone Co., Inc., Nashville, Tenn.; and O. M. Stull, Liberty Limestone Corp., Buchanan, Va. North Central Region: H. A. Clark, Consumers Co., Chicago, Ill.; W. D. Dillon, Dillon, Sharpe and Co., Columbus Junction, Iowa; James Eells, Basic Dolomite, Inc., Cleveland, Ohio; A. E. Hanshaw, Lehigh Stone Co., Kankakee, Ill.; A. K. Hausman, Kelley Island Lime and Transport Co., Cleveland, Ohio; L. W. Hayes, Kansas City, Mo.; P. E. Heim, Carbon Limestone Co., Youngstown, Ohio; W. E. Hewitt, East St. Louis Stone Co., East St. Louis, Ill.; H. C. Krause, Columbia Quarry Co., St. Louis, Mo.; Ed. J. Leary, Ed. J. Leary Construction Co., River Falls, Wis.; S. J. Marks, Material Service Corp., Chicago, Ill.; F. W. Mumma, Columbia Quarry Co., St. Louis, Mo.; Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Iowa; Norbert Neuheisel, Neuheisel Lime Works, Eau Claire, Wis.; and R. M. Seifreid, National Lime and Stone Co., Findlay, Ohio. Southern Region: W. M. Palmer, Dolomite Products, Inc., Ocala, Fla.; E. V. Scott, Southwest Stone Co., Dallas, Texas; C. M. Sims, Campbell Limestone Co., Gaffney, S. C.; and R. T. Willingham, Willingham-Little Stone Co., Atlanta, Ga. Western Region: J. J. Stark, Girard, Kans. Representing the National Crushed Stone Association: Otho M. Graves, General Crushed Stone Co., Easton, Penn.

## Named Superintendent

J. S. REDDICK, formerly in charge of the asphalt plants of the Fenton Construction Co. at Pomeroy and Marietta, Ohio, has been appointed superintendent of the Troy, Piqua and Urbana plants. JAMES A. PRATT, associated for many years with the Bowsman Washed Sand and Gravel Co., Troy, Ohio, will assist Mr. Reddick as sales engineer. VIRGIL S. LATTER has been named to head the concrete block plant at Troy, replacing WALTER WAITE who has been transferred to a new capacity at Ashland.

## Heads Operations

HOWARD F. KICHLINE, chief chemist and assistant operating manager at the Catskill, N. Y., plant of the North American Cement Corp., New York, N. Y., has been named operations manager and will have charge of the plants at Catskill and Howe's Cave, N. Y.; Security, Md., and Berkeley, W. Va. Mr. Kichline joined the company in 1915 when it was known as the Acme Cement Co., and was plant chemist for five years.

## On Producers' Council

E. H. VAN DUZEE, director of merchandising, National Gypsum Co., Buffalo, N. Y., has been appointed a director and member of the executive committee of Producers' Council, Inc., Washington, D. C., an organization of building materials manufacturers.

## Retires as Foreman

F. L. HERBERT has retired as foreman at the Wampum, Penn., plant of the Medusa Portland Cement Co., Cleveland, Ohio, after 37 years of service. Mr. Herbert joined the company when it was known as the Crescent Cement Co.

## Better Concrete Meeting

UNDER the sponsorship of the Keystone Division of Dravo Corporation, one of the largest producers of sand and gravel in the Pittsburgh area, 75 concrete suppliers, specifiers, contractors and engineers from Western Pennsylvania attended a one-day symposium on "Better Concrete."

RAY V. WARREN, secretary of the Western Pennsylvania Sand and Gravel Producers Association, conducted the morning session during which aggregates were defined and explained. The afternoon session was led by Rowland Jones, of Dravo Corporation, who discussed strength concrete and air-entrained concrete. W. E. Clark, general manager of Keystone Division, explained that the purpose of the meeting was to exchange knowledge on problems confronting the concrete industry. He pointed out that poor concrete, no matter who sells it, is an indictment of the industry in general while good concrete reflects credit on the industry.

Samples of emery used as aggregates were demonstrated by Jos. J. Push, Walter Maguire Co., New York, N. Y., who recommended the use of emery for special purpose floors where traffic is heavy and wear excessive.

## Retires from Bureau of Mines

DR. OLIVER BOWLES, chief of the Nonmetal Economics Division of the Bureau of Mines, has retired after 33 years of Government service, to devote his time to writing, consulting work, and to his hobby of flower culture. Dr. Bowles is internationally known for his pioneer achievements in the field of nonmetallic minerals and as an authority on quarrying and mining operations in the United States and Europe. He has written more than 250 publications covering nonmetallic minerals, of which 143 were official Bureau of Mines' publications. He is also the author of "The Stone Industries"—a 500-page book on quarrying in the United States—which has had widespread circulation and use in schools and colleges.

Dr. Bowles recently was elected a director of the American Institute of Mining and Metallurgical Engineers. He is also a charter fellow of the Mineralogical Society of America, and a member of the New York Academy of Sciences, and Society of Economic Geologists. In 1935 he made a study of the stone and slate industries of England, Wales, Belgium, and France, and presented a paper on limestone

**Some of those who attended forum on "Better Concrete." Left to right, seated: L. E. Zebley, J. S. Cluss, R. V. Warren, J. J. Pugh, H. F. Bair, C. F. Eggers, H. Teggart, J. E. Russell, E. Merling, J. G. McFarland, H. P. Roberts, and D. Sphar**

quarrying in the United States to the Institute of Quarrying of Great Britain, of which he is an honorary member.

## Crushed Stone Directors

AT the recent convention of the National Crushed Stone Association, the following were elected to the Board of Directors:

Three new members were elected to the board of directors; Bruce S. Campbell, Harry T. Campbell Sons' Co., Towson, Md.; W. S. Weston, Jr., Weston and Brooker Co., Columbia, S. C.; and H. C. Krause, Columbia Quarry Co., St. Louis, Mo.

The board of directors is as follows:

G. A. Austin, Chairman, Consolidated Quarries Corp., Decatur, Ga.

Wm. M. Andrews, Union Limestone Co., New Castle, Penn.

L. J. Boxley, Blue Ridge Stone Corp., Roanoke, Va.

H. H. Brandon, Melvin Stone Co., Melvin, Ohio

J. E. Bryan, Bryan Rock and Sand Co., Inc., Raleigh, N. C.

J. Reid Callanan, Callanan Road Improvement Co., South Bethlehem, N. Y.

Bruce S. Campbell, Harry T. Campbell Sons' Corp., Towson, Md.

W. N. Carter, National Stone Co., Joliet, Ill.

A. J. Cayia, Inland Lime and Stone Co., Manistique, Mich.

H. N. Clark, Dolomite Products Co., Inc., Rochester, N. Y.

T. C. Cooke, Lynn Sand and Stone Co., Swampscott, Mass.

F. O. Earnshaw, Carbon Limestone Co., Youngstown, Ohio

Arthur F. Eggleston, John S. Lane and Son, Inc., Meriden, Conn.

E. Eikel, Servtex Materials Co., New Braunfels, Texas

Otho M. Graves, General Crushed Stone Co., Easton, Penn.

C. G. Hammerschmidt, Elmhurst-Chicago Stone Co., Elmhurst, Ill.

R. G. L. Harstone, Canada Crushed Stone, Ltd., Hamilton, Ont., Canada

J. L. Heimlich, LeRoy Lime and Crushed Stone Corp., LeRoy, N. Y.

R. P. Immel, American Limestone Co., Knoxville, Tenn.

N. E. Kelb, Cumberland Quarries, Inc., Indianapolis, Ind.

H. C. Krause, Columbia Quarry Co., St. Louis, Mo.

J. C. Tauber, Trap Rock Co., Minneapolis, Minn.

M. E. McLean, East St. Louis Stone Co., East St. Louis, Ill.

V. C. Morgan, Kentucky Stone Co., Louisville, Ky.

Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Iowa.

W. T. Ragland, Superior Stone Co., Raleigh, N. C.

H. E. Rainer, Federal Crushed Stone Corp., Buffalo, N. Y.

Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio

J. A. Rigg, Acme Limestone Co., Fort Spring, W. Va.

**W. S. Weston, Jr., of Weston & Brooker Co., new member (and youngest) of the National Crushed Stone Association Board**

A. B. Rodes, Franklin Limestone Co., Inc., Nashville, Tenn.

W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.

James Savage, Buffalo Crushed Stone Corp., Buffalo, N. Y.

F. W. Schmidt, Jr., North Jersey Quarry Co., Morristown, N. J.

A. T. Smith, Rock Hill Quarries Co., St. Louis, Mo.

O. M. Stull, Liberty Limestone Corp., Buchanan, Va.

Stirling Tomkins, New York Trap Rock Corp., New York, N. Y.

W. H. Wallace, Wallace Stone Co., Bay Port, Mich.

W. S. Weston, Jr., Weston and Brooker Co., Columbia, S. C.

D. L. Williams, Virginian Limestone Corp., Ripplemead, Va.

A. J. Wilson, Granite Rock Co., Watsonville, Calif.

W. F. Wise, Southwest Stone Co., Dallas, Texas

A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn.

### Representing the Agricultural Limestone Division

James Eells, Basic Dolomite, Inc., Cleveland, Ohio

A. Battle Rodes, Franklin Limestone Co., Inc., Nashville, Tenn.

S. P. Moore, Concrete Materials and Construction Co., Cedar Rapids, Iowa

### Representing the Manufacturers' Division

R. C. Johnson, Simplicity Engineering Co., Durand, Mich.

L. C. Mosley, Marion Power Shovel Co., Marion, Ohio

J. B. Terbell, American Manganese Steel Division, The American Brake Shoe Co., New York, N. Y.

## Projects Engineer

CHESTER D. RUGEN, formerly operating engineer, has been appointed projects engineer of the Universal Atlas Cement Co., New York, N. Y. Mr. Rugen, a graduate of Purdue University in civil engineering, joined the engineering department of the company in 1930 and was appointed operating engineer in 1942. He is the author of "New Modern Wet-Process Cement Plant," which appeared in the March and April, 1939, issues of ROCK PRODUCTS, pp. 26 and 37, respectively; "Experiences in Grinding Raw Materials for Portland Cement," and joint author of "How to Improve Grinding," ROCK PRODUCTS, March, April and May, 1940, pp. 33, 31 and 35, respectively.

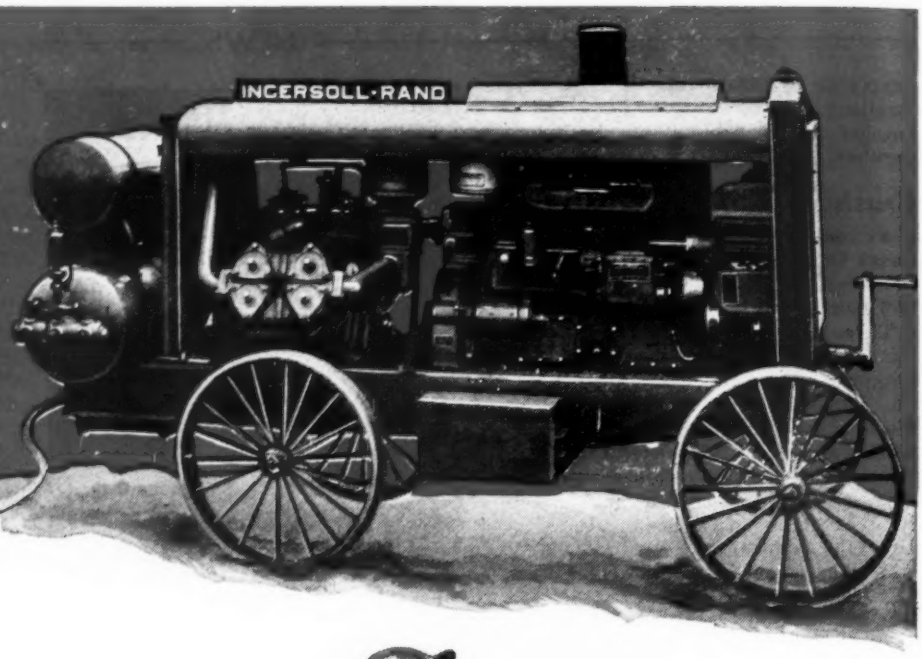
JOSEPH A. KIVERT, special engineer, operating department, has been appointed to succeed Mr. Rugen as operating engineer. Mr. Kivert is a graduate chemical engineer of Lehigh University, Bethlehem, Penn. During his college vacations he worked as a laborer at the Northampton plant, and later as a chemist. In 1933 he moved to New York as special engineer, first in the engineering department and later in the operating department. Mr. Kivert is a member of the American Institute of Mining and Metallurgical Engineers.

## Correction

IN THE ARTICLE, "Automatic Batching of Sacked Dry Mixes," appearing in the November, 1946, issue of ROCK PRODUCTS, an error occurred in the caption of the illustration showing the names of the men who helped design and build the Sakrete dry mixed concrete plant. The man shown to the left in the illustration was not Arthur C. Avril head of Sakrete Incorporated, Cincinnati, Ohio, as indicated by the incorrect caption, but one of the workmen of the plant. The accompanying portrait illustration shows the real Arthur C. Avril. Our apologies are extended to Mr. Avril.

**Arthur C. Avril**

# ASSURE CLEANER VALVES HERE...



## MORE AIR HERE

**GET LONGER DRILL LIFE!**

Prolong the life of your drills — assure fewer repairs and replacements — by lubricating them with Texaco Rock Drill Lubricants (E.P.). These famous, extreme-pressure lubricants prevent rust, resist wash-out, effectively protect all moving parts against wear even in the heaviest service. All conform to the lubrication specifications set by leading rock drill manufacturers.

LUBRICATE your compressors with *Texaco Alcaid, Algol or Ursa Oil* and valves will stay *clean* . . . assuring more efficient and economical compressor operation with full air pressure at your drills hour after hour.

*Texaco Alcaid, Algol and Ursa Oils* are free of impurities that lead to formation of hard carbon deposits. They keep rings free, valve action smooth and lively, ports and air lines clear. They provide Effective Lubrication for all your compressors — whatever their type or size.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO REG. T.M.

# TEXACO Lubricants and Fuels

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

# INDUSTRY *News*

## New Cement Plant for British Columbia

BRITISH COLUMBIA CEMENT CO., LTD., Victoria, B. C., is planning to start construction of a $3,000,000 cement plant at Horne Lake, Vancouver Island. Work is expected to be under way by midsummer or early in the fall, according to Nigel A. Tomlin, managing director of the company. Mr. Tomlin said the first unit, designed to produce 600,000 bbls. of cement a year, will be in production by the fall of 1948. It is reported that the supply of high grade limestone at Horne Lake is practically inexhaustible.

## Lack of Freight Cars Hampers Lime Plants

A CRITICAL SHORTAGE of box cars has caused a number of lime plants in the Woodville and Gibsonburg, Ohio, districts to shut down. According to L. E. Johnson, secretary and general manager of the Ohio Finishing Lime Association, plants at Woodville and Gibsonburg normally require a total of 100 cars daily to ship their output. In the last week in January only three box cars were sent into the area for shipping lime. A very large proportion of all the finishing lime produced in the United States is manufactured in this area.

## Cement-Gypsum Ship

PERMANENTE STEAMSHIP CO., a Henry J. Kaiser enterprise, has purchased the *Silver Bow Victory* and is converting it into a bulk cement and gypsum carrying ship. Conversion includes insulation of bins and conveyors for handling bulk materials, and the installation of pumping equipment. The ship will be used on a triangle run, carrying cement from Redwood City, Calif., to Honolulu, or to Seattle or Portland.

## Dry Mix Concrete License

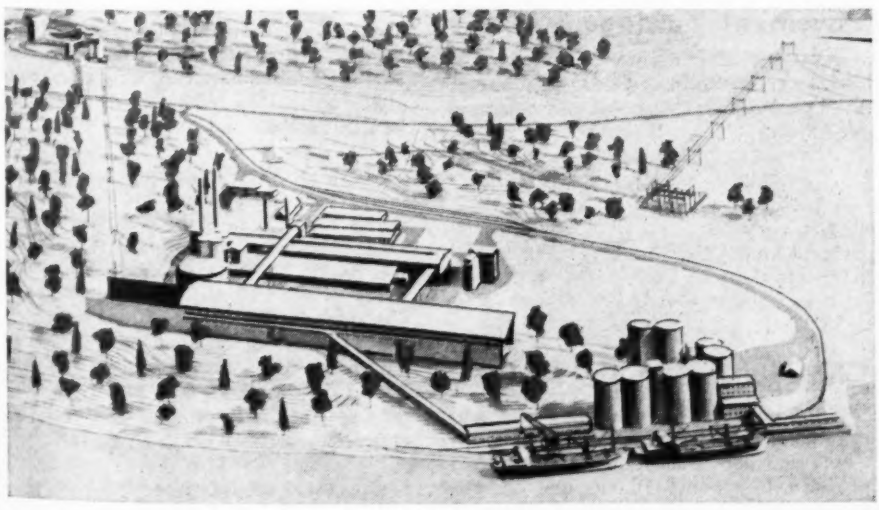
HARRY T. CAMPBELL SONS CORPORATION, Baltimore, Md., manufacturers of Sakrete dry mix concrete under license from Sakrete Incorporated, Cincinnati, Ohio, has extended their license to include the States of New York, Connecticut, Rhode Island, Pennsylvania, New Jersey, Virginia, and Florida. One or more plants are to be installed in each of the above States to serve them economically. Sakrete is available in 21 States out of 48 with licensees in all of them.

## Filling Agstone Contracts

THE CONCRETE MATERIALS AND CONSTRUCTION CO., Cedar Rapids, Iowa, recently started to crush limestone near Palmyra, Mo., to fill a contract with the Marion County AAA for 40,000 tons of agricultural limestone. About two months would be required to fill the contract, according to Guy Dunham, superintendent of operations.

## Ship Phosphate to Japan

ABOUT 600,000 tons of rock phosphate is being shipped to Japan and Korea from North Pacific ports. The raw materials will be converted to fertilizer in the Orient as part of a program to encourage food production. The phosphate rock is obtained in strip mining operations in Idaho and Montana.



**Model of cement plant now being built by Skanska Cement Co., Sweden. There are two cement kilns, and a shorter rotary kiln which will be used alternately for lime and white cement**

## New Texas Quarry

THE LEANDER LIMESTONE CORPORATION, Leander, Texas, recently made its first shipment of stone from its new quarry three miles west of this city. The new quarry is said to be the third to go into operation in the Leander area. Officers of the corporation are: R. K. Allen, of Leander, president; Lois F. Giddens of Leander, vice-president; J. W. Hanson of San Angelo, secretary and treasurer; and Ross Correll and Chester Lankford, both of Austin, directors.

## Puerto Rico Cement Plant

GOVERNOR J. T. PINERO of Puerto Rico has announced an industrialization program for the Island to raise the standard of living. On the program is a second cement plant to be built by private capital to supplement the government-built plant.

## Gypsum Expansion Program

NATIONAL GYPSUM CO., Buffalo, N. Y., has announced that it will spend $600,000 on an expansion program for its plant at Niles, Ohio. John J. Manofsky, general manager of the plant, said that the new plant building will house gypsum lath manufacturing facilities.

## Open Crushing Plant

WEAVER CONSTRUCTION CO., has started producton in a new $140,000 crushing plant near Iowa Falls, Iowa. Commercial stone, agricultural limestone and concrete aggregates are being produced at the rate of 1000 tons per day.

## Buy Sand Concern

ROACH SAND & GRAVEL CO., St. Francis, Kans., has been purchased by Kenneth Nighswonger. Tom Roach, who has operated the pit for several years, was forced to abandon the business because of ill health.

## Cement Dock Deal

IDEAL CEMENT CO., Denver, Colo., has signed a lease with the Alabama State Docks Commission for its Mobile, Ala., plant, agreeing to pay 10¢ a net ton on all raw materials moving into the plant via water. The State is guaranteed $20,000 annually.

## Increase Sand Capacity

MATERNE SAND CO., Spokane, Wash., with pits at Francis and Cedar, will increase its capacity to 400 cu. yd. daily. A bulldozer and truck were also added to the equipment.

## Cement Production

BUREAU OF MINES reports that production of finished cement during December, 1946, totaled 14,557,000 bbl. or 49 per cent above that reported for December, 1945. Although the December, 1946, total represents a decrease from the September peak of 16,450,000 bbl., it still remains above the usual seasonal trend. Seventy-one per cent of capacity was utilized, a figure of 23 per cent above that reported for the corresponding month of 1945. Stocks of 10,893,000 bbl. on December 31, 1946, are 34 per cent below that reported for December, 1945, but follow the usual seasonal upswing at the end of the year. Mill shipments reached 11,494,000 bbl. in December, 1946, an increase of 88 per cent over that reported in December, 1945.

Demand for cement in December, 1946, continued good and although they follow the usual seasonal trend the quantity shipped was considerably above that reported for the same month of the previous year, and the 1935-39 average. This is reflected in the fact that all districts in continental United States show an increase over the corresponding month of 1945. The increases range from 21 per cent in Texas to 254 per cent in Tennessee.

The following statement gives the relation of production to capacity, and is compared with the estimated capacity at the close of December, 1946, and of October, 1945.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

| | Dec. 1946 | Dec. 1945 | Nov. 1946 | Oct. 1946 | Sept. 1946 |
|---|---|---|---|---|---|
| The month.. | 71.0 | 48.0 | 78.0 | 81.0 | 83.0 |
| 12 months .. | 68.0 | 43.0 | 66.0 | 64.0 | 62.0 |

## Start Work on Gypsum Plant to Cost $6,000,000

NATIONAL GYPSUM CO., Buffalo, N. Y., has started work on its new $6,000,000 gypsum plant at Baltimore, Md. Melvin Baker, president of the company recently participated in cornerstone-laying ceremonies.

Said to be one of the most modern gypsum board plants ever to be built, the new plant will use gypsum brought from Nova Scotia by boat. A new pier serving the plant is to be built by the city of Baltimore at a cost of $1,519,000. It will have a capacity for handling 500 tons of gypsum an hour. A mill building, board plant, power house and office, employes service building and maintenance shop and garage will make up the major part of the gypsum plant. Gypsum plaster will be made in the mill building at the rate of 90 tons per hour. In the board plant, the production will be about 120 ft. per minute. The power plant will generate steam at the rate of 60,000 p.s.i.

In addition to the new Baltimore plant, additions at the Rotan, Texas, plant to be completed in July will cost $1,000,000, and the latest addition to the Savannah, Ga., plant will cost $750,000.

## Advance Cement Prices

FIVE cement producers in the Northeast area have announced increases in the prices of cement from 10 to 20¢ a barrel. Shipments from plants in the Valley Forge-Allentown, Lehigh Valley area of Pennsylvania were up 15 to 20¢ a barrel, while a 10¢ rise was made in New England and 15¢ for New York. The price of cement in bags is not affected by the latest increase. Higher prices of coal and increased freight rates along with increased labor costs have combined to force prices of cement to a higher level.

## Rocklite Producer

A. G. STREBLOW, president of Basalt Rock Co., in association with the managers, superintendents and other executives of the company, have organized a company to be known as Management and Superintendent Group of Basalt Rock Co., which will have the exclusive rights to use Rocklite, a prepared lightweight aggregate, for precast concrete manufacture in Southern California. A plant will be built at Ventura, Calif., to be equipped with Besser block and mixer machinery. The block plant will get its aggregate direct from Rocklite, Inc.

## "Ex Quota" Cement Exports

EXPORT applications from portland cement manufacturers faced with the prospect of closing down plants because of limited storage facilities will be received and acted upon without reference to the present export quota, according to a recent ruling of the Department of Commerce. Such producers must indicate upon the applications, Form IT-419, that the quantities which they seek to export would not otherwise be produced.

## Pavement Yardage

AWARDS of concrete pavement for January, 1947, have been announced by the Portland Cement Association as follows:

| | Square Yards Awarded in January, 1947 |
|---|---|
| Roads ..... | 605,500 |
| Streets and Alleys ... | 711,228 |
| Airports ..... | 26,100 |
| Total ..... | 1,342,828 |

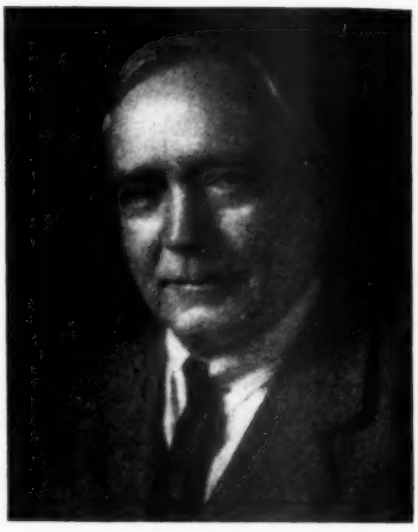
## Chicago Aggregate Needs

BIDS have been announced for an extensive street repair program in Chicago which call for 40,000 tons of crushed limestone, 12,000 bbl. of cement, 6000 tons of sand, 6000 tons of gravel, and 6000 tons of limestone dust.

## OBITUARIES

CLARENCE CARL HERMANN, president and general manager of C. C. Hermann & Associates, Detroit, Mich., passed away January 20.

RICHARD BERNHARD, chief engineer, The Traylor Engineering and Manufacturing Co., Allentown, Penn., died February 2 at the age of 73. Mr.



Richard Bernhard

Bernhard had been considered one of the world's outstanding mining machinery engineers and had been chief engineer of the company since 1917.

WILLIAM D. MANCHESTER, vice-president of the Lynn Sand and Stone Co., Swampscott, Mass., until his retirement a few years ago, died at his home in Topsfield, Mass., on January 26. Born in Plainville, Conn., Mr. Manchester came to Massachusetts in 1920 and with J. H. Cooke, then of Hartford, Conn., founded the Lynn Sand and Stone Co. He built the company's crushed stone plant in Swampscott, Mass. Mr. Manchester had attended every convention of the National Crushed Stone Association from 1926 until two years ago when his health failed.

HERMAN W. FALK, chairman of the board and founder of the Falk Corp., and a director of Allis-Chalmers Mfg. Co., both of Milwaukee, Wis., died February 17 at Daytona Beach, Fla., after a short illness. He was 79 years old. Mr. Falk also was a member of the executive committee of Allis-Chalmers Mfg. Co., a member of the board of the Heil Co., and president of the Falk Investment Co. and the Hope Investment Co.

CHARLES R. NEFF, co-founder and treasurer of The Neff & Fry Co., Camden, Ohio, passed away on January 4. He was 74 years old.

## Life Insurance for Employes

HENRY J. KAISER COMPANY and associated companies, Oakland, Calif., recently announced that life insurance valued at more than $25,000,000 was made available recently to some 11,000 permanent employes of Henry J. Kaiser-managed companies. Under a joint participation plan, the companies will bear all the expense for employes with five years or more service, and will bear a substantial part of the expense for employes with less than five years service.

## Double Gypsum Capacity

NATIONAL GYPSUM CO., Buffalo, N. Y., has plans to double the capacity of its plant and mines in Barber county near Medicine Lodge, Kans. While the program will be completed over a number of years, new machinery now on order amounts to $60,000, and total expenditures will be about $1,000,000.

## Wins Safety Award

THE DEWEY CEMENT COMPANY'S plant at Davenport, Iowa, has been awarded the National Safety Council's Distinguished Service to Safety award in recognition of an operating record in excess of 1,500,000 manhours without a disabling injury. Only seven cement plants have been given this award.

## Reopen Old Quarry

QUARRYING will be resumed at Limerock near Lincoln, R. I., after a lapse of 33 years, near the old Harris Lime Company kilns, abandoned for many years. It is reported that Conklin Limestone Co., Canaan, Conn., is interested in the new agricultural limestone plant.

## To Dredge Sand

THE BLUE RAPIDS SAND AND GRAVEL CO., Blue Rapids, Kans., has purchased 80 acres of land adjacent to the Blue River, four miles east of Blue Rapids, and has erected equipment for obtaining sand and gravel from the river bed.

## Quarry Fire

BRUMHALL COMPANY, operator of a quarry southeast of Gilliam, Mo., suffered a fire loss of about $10,000 recently, but plans have been made to rebuild and secure new equipment. Temporary operations have been resumed in a Quonset hut.

## To Mine Rock

THE LORING QUARRIES, Bonner Springs, Kans., has received most of its heavy equipment for operation of the new crushing plant, according to Emmett Conlan, local superintendent. It is planned to start mining operations by March 15.

## Manufacturers' Luncheon

Associate members of the National Crushed Stone Association held their convention meeting at a luncheon instead of the traditional breakfast. The turnout was excellent.

J. B. TERBELL, American Manganese Steel Division, The American Brake Shoe Co., New York, N. Y., was reelected chairman. R. C. Johnson, Simplicity Engineering Co., Durand, Mich., and L. C. Mosley, Marion Power Shovel Co., Marion, Ohio, were elected with Mr. Terbell to serve the Manufacturers' Division on the Board of Directors of the National Crushed Stone Association.

VICE-CHAIRMEN, in addition to Messrs. Johnson and Mosely are Cott Farrell, Easton Car and Construction Co., Easton, Penn.; J. Craig McLanahan, McLanahan and Stone Corp., Hollidaysburg, Penn.; J. A. Trainor, Taylor-Wharton Iron and Steel Co., High Bridge, N. J.; and C. H. Roberts, Traylor Engineering and Manufacturing Co., Allentown, Penn.

KENNETH LINDSAY, Iowa Manufacturing Co., Cedar Rapids, Iowa, was elected to the Board of Directors to succeed P. C. Tennant, and John M. Jeffries, Atlas Powder Co., Wilmington, Del., succeeds W. C. Davis of the same company on the Board.

Exclusive of the foregoing new directors, vice-chairman and chairman, the Board of Directors comprises:

E. C. Anderson, Kensington Steel Co., Chicago, Ill.

A. E. Conover, Robins Conveyors, Inc., Passaic, N. J.

Irving Deister, Deister Machine Co., Fort Wayne, Ind.

M. A. Eiben, Northern Blower Co., Cleveland, Ohio

S. S. Ellsworth, Ensign-Bickford Co., Simsbury, Conn.

Cott Farrell, Easton Car and Construction Co., Easton, Penn.

R. F. Feind, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

J. Harper Fulkerson, Cross Engineering Co., Carbondale, Penn.

E. J. Goes, Koehring Co., Milwaukee, Wis.

E. M. Heuston, Bucyrus-Erie Co., South Milwaukee, Wis.

C. S. Huntington, Link-Belt Co., Chicago, Ill.

R. C. Johnson, Simplicity Engineering Co., Durand, Mich.

W. W. King, W. S. Tyler Co., Baltimore, Md.

B. R. Maloney, E. I. Du Pont de Nemours & Co., New York, N. Y.

J. Craig McLanahan, McLanahan & Stone Corp., Hollidaysburg, Penn.

L. C. Mosley, Marion Power Shovel Co., Marion, Ohio

R. M. Murdock, The Frog, Switch & Mfg. Co., New York, N. Y.

Milo A. Nice, Hercules Powder Co., Wilmington, Del.

F. O. Ready, Kennedy-Van Saun Mfg. Co., New York, N. Y.

C. H. Roberts, Traylor Engineering & Mfg. Co., Allentown, Penn.

Bruce G. Shotton, Hendrick Mfg. Co., Pittsburgh, Penn.

J. A. Trainor, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

R. E. Wiley, American Cyanamid Co., New York, N. Y.

Roy Wills, Lima Locomotive Works, Lima, Ohio

W. A. Wirene, General Electric Co., Schenectady, N. Y.

SECRETARY J. R. BOYD expressed to the Manufacturers' Division the appreciation of the N.C.S.A., for its $3000 contribution to the Association to compensate for lack of revenue due to the fact exhibits were not held in 1946. The Division voted unanimously to contribute an equal amount for this year.

Mr. Boyd expressed for the N.C.S.A. its desire to have exhibits at the annual convention, Cincinnati, Ohio, in 1948, and the Division appointed a committee to determine whether exhibits will be held the following year to put the shows on a calendar in alternate years with the Road Show. The committee will report its decision at the N.C.S.A. Board of Directors Meeting to be held in July, 1947, at Hot Springs, Va.

The same committee, comprising Messrs. Johnson, Mosely and Terbell, will consider the appointment of a Director of Exhibits. The Division voted to express its appreciation to L. W. Shugg for his work as Director of Exhibits over the past many years. Mr. Shugg retired from the General Electric Co. during 1946.

Resolutions were passed thanking G. A. Austin, president of the N.C.S.A., for his helpful interest in the Manufacturers' Division, Chairman Terbell and J. R. Boyd and his staff. It was also resolved to send a telegram of good wishes for a speedy recovery of C. S. Huntington, Link-Belt Co., absent due to illness, and that suitable expression of the sorrow in the death of E. J. Krause, Columbia Quarry Co. be spread over the minutes of the meeting and that copies be sent to Mr. Krause's family and company.

### COMING CONVENTIONS

**American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 16-20, 1947.**

**National Industrial Sand Association, Annual Meeting, The Homestead, Hot Springs, Va., May 14-16, 1947.**

**Wabash Valley Ready Mixed Concrete Association, Stevens Hotel, Chicago, April 10-11.**

# HINTS and HELPS

## PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

### Dozer for Quarry Cleanup

By N. L. HARWELL,
Quarry Supt., Marquette Cement Mfg. Co.

WHEN the bulldozer is down for repairs or is engaged in other work, a dump truck can be used to clean the quarry floor with the aid of an inexpensive blade made in your own shop. Remove the truck bumper and replace it with a light section of 6-in. channel iron the same length as the bumper with lugs welded on each end for hinges. For the blade a ⅜-in. flat iron is used and ⅜- x 2- x 2-in. angle sections for braces from bumper or channel to blade. A ⅜-in. cable from truck bed to blade is employed for raising and lowering.

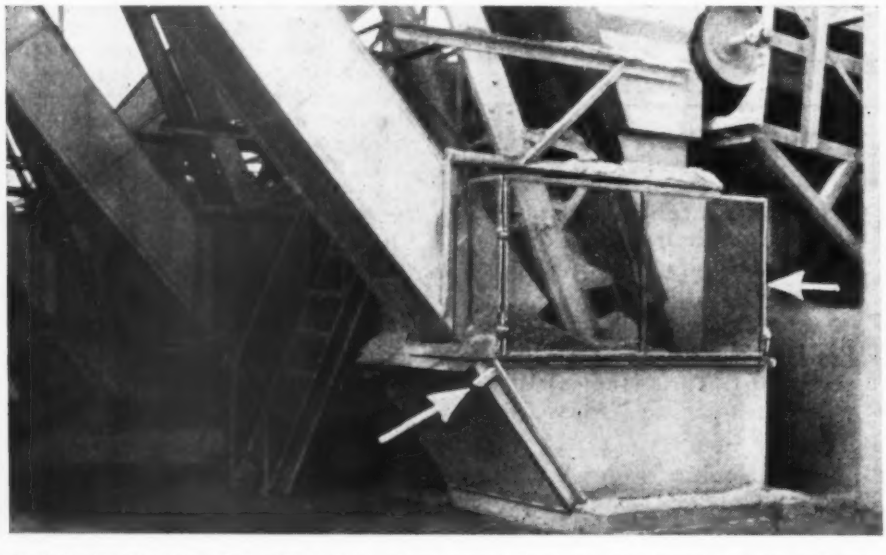
We find that by leaving the channel iron on the truck to serve as a bumper, that the blade can be installed or removed in a few minutes and the truck is free to use for any other work.

This equipment is not expected to do the heavy jobs that a bulldozer will do, but for cleaning the floor after blasting it is efficient and plenty fast.

### Easily Cleaned Elevator Boot

AT THE NEW PLANT of the Azusa Sand and Gravel Co., in the San Gabriel-Azusa district east of Los Angeles, bucket elevators have been used extensively and with remarkable success. The reason why the elevators have been operating so successfully is that the troubles commonly expected from elevators were studied and the design and installation were arranged to overcome the difficulties.

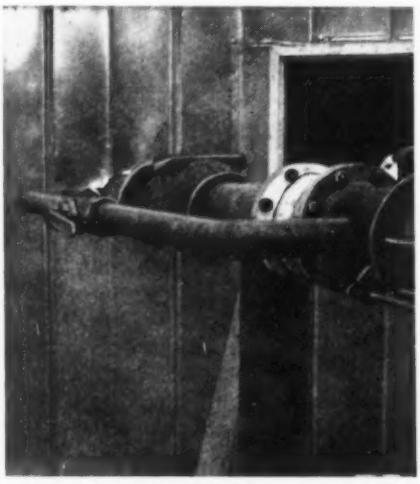
The illustration shows how the boot of the elevator is built. The tail pulley is off the ground line about 3 ft. and the housing surrounding this pulley has a trap door with a "dog" catch at the top. If the elevator stalls for any reason, a sharp blow on the dog releases the gate which is hinged at the bottom. The screen, above, at the sides permits inspection and keeps out stray pieces of lumber or other foreign material that might be accidentally dropped into the elevator boot.



Bucket elevators have tail pulleys 3 ft. above ground line, and are housed in with protective screen, above, and hinged release at at one end. Arrows point to screen and release gate

### Pump Discharge Assembly

WHERE a centrifugal pump is used to deliver fresh water to the screening plant, several accessories should be provided for proper operation of the pump.



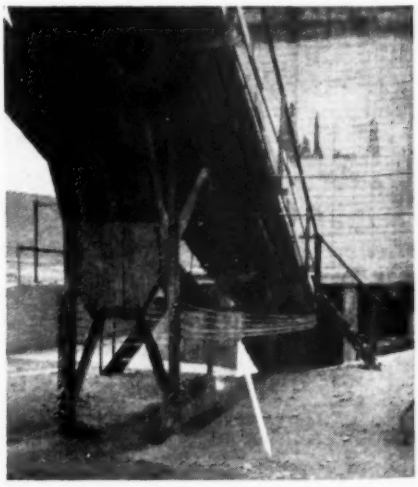
Pipe line from centrifugal pump equipped to supply water for priming with 3-in. offtake

One operator using an 8-in. Byron-Jackson, two-stage centrifugal pump delivers to a 12-in. pipe which is about two miles long. The lift is not great but the volume is. Near the pump house, an expansion joint has been provided in the line (shown to the right in the illustration). Next on the main line is a bell reducer, from 12 to 8-in. diameter, which is followed by an 8-in. check valve. Ahead of the bell reducer, a 3-in. pipe, off the main line, is carried over the check valve.

This 3-in. line has a 3-in. valve in it, the primary function of which is to supply water from the main line for priming the pump. This is a simple arrangement for areas where freezing of water in the line over night is not expected, but for colder regions it is not recommended.

### Remote Gate Controls

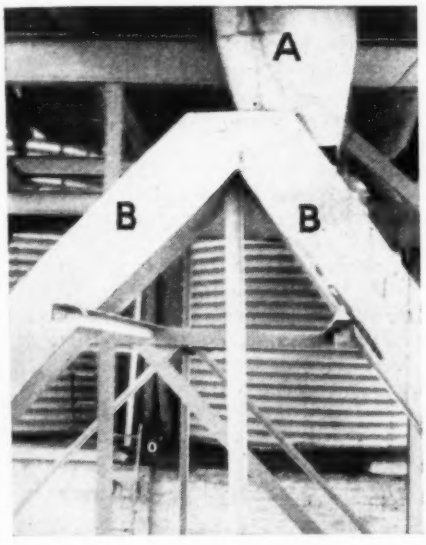
KERN ROCK CO., Bakersfield, Calif., operates a large fleet of Autocars with Freuhauf trailer bodies which deliver the aggregate to the company's ready mix plant in Bakersfield. For loading these trucks a reclaiming belt runs under the concrete bunkers with each bin having a suitable gate. A series of parallel wires, each with a metal tag affixed to its end connects with each gate. The tagged ends of the wires are near the load-operator's station. To get the desired material, the operator reads the tag on the wire and pulls on the wire which opens the gate. A 20-ton pay load can be loaded in a matter of minutes. He very seldom has to go in the reclaiming tunnel even to clean up, for the concrete tunnel has a steep pitched floor and by turning on a heavy stream of water at the high end, the tunnel can be quickly sluiced out and kept spick and span.



Wires extending out of reclaiming belt conveyor tunnel have tags permitting operator to pull wire opening gates controlling flow of desired material. Arrow points to wires

## Bucket Type Sand Deflector

MOST OPERATORS make only one kind of sand at a time, concrete or plastering sand, and the use of stacker belts for these materials is well known. At one operation when concrete sand is being produced, the swinging bucket, marked "A" on the illustration, is swung over one of the loading chutes "B," serving the stacker belt. When plaster sand is being made, the bucket is swung over the other chute. These



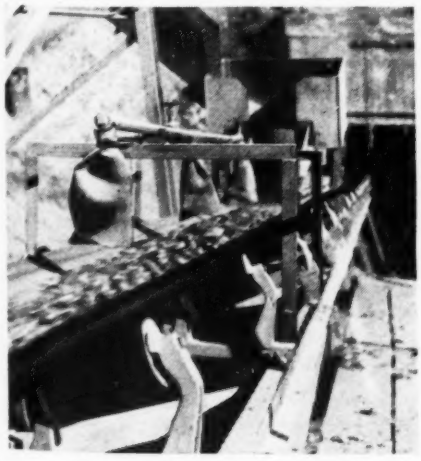

Sand deflector "A" swings to either side, depending on whether plaster sand or concrete sand is being made

operators prefer this type of "cutter" as it insures a minimum of spillage.

At this plant, a Wemco hydro-separator and Akins spiral classifiers prepare the two sands on the steel deck above the swinging bucket, which is controlled from this deck.

## Hooded Water Sprays

AT A WESTERN sand and gravel operation dry sand for concrete is scalped out ahead of the washing section, thereby getting a product that has all the fines that the pit offers. At times this is a dusty problem so when this section of the plant is in



Inner tubing covers water sprays

operation (particularly on windy days or when material is uncommonly dry) three water sprays mounted over the main conveyor belt to plant are used. The sprays are covered with rejected inner tubing so that the water all reaches the belt and not the surrounding area. Only a little water is used as otherwise it tends to clog the sand screen in the dry section.

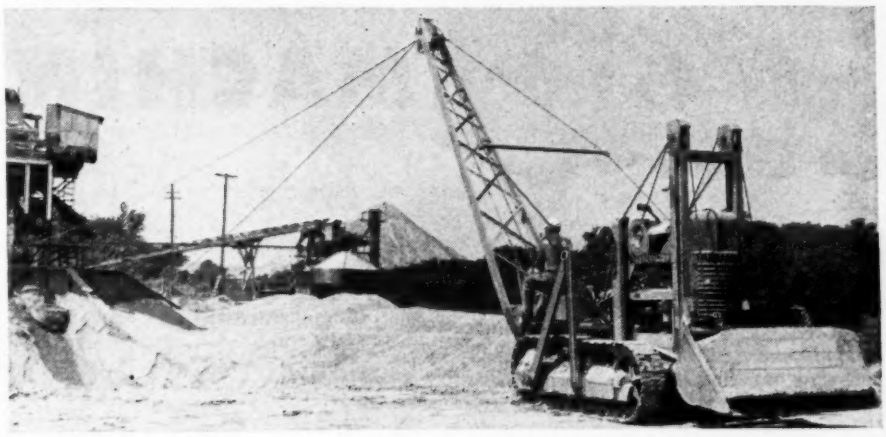
## Conveyor Belt Wind Protectors

DURING a wind storm of modest velocity, a large western sand and gravel plant had to shut down because the long conveyor belts were lifted off the

Conveyor structure designed so that wind breakers can be bolted in place

troughing rolls by the wind. After the plant was shut down, the belts were tied at frequent intervals to hold them in place. As this was a new plant, the management decided to make changes to correct this trouble.

At the Kern Rock Co., near Bakersfield, Calif., Dan Sill, owner, has erected the main pit-to-plant conveyor as shown in the illustration. With this arrangement, wind breakers can be bolted in place, but to date none have been needed. This idea may be applicable where the entire conveyor is to be protected.



Tractor and crane operates scraper bucket in handling material to live storage

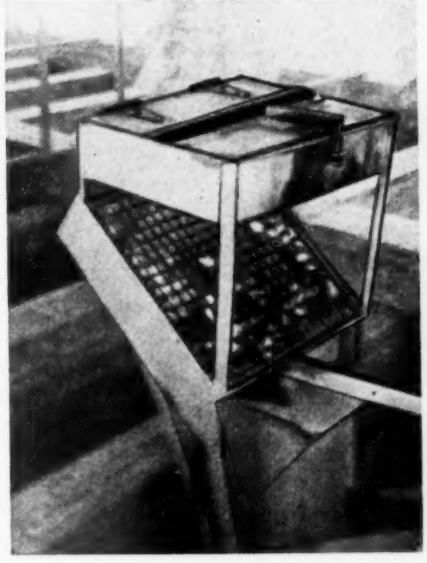
## Stockpiling with Tractor and Scraper Bucket

WESTERN SAND AND GRAVEL CO., Spring Valley, Ill., hit upon an unusual arrangement to reclaim material to live storage in its Kern system of stockpiling aggregates.

As shown in the illustration, a Caterpillar Diesel D4 tractor with Hyster donkey and crane and a Trackson Traxcavator supplies the portable power plant to operate the slackline cableway excavator and bucket. The cable is 360 ft. long. It will be noted that a slab of concrete in the bucket of the Traxcavator acts as a counterbalancing weight.

## Final Loading Screen

AT A WESTERLY OPERATION some of the larger sizes of gravel are given a final screening just as the materials fall into the trucks. A small screen about 3- x 3-ft., is mounted under the gate. The oversize falls to the truck and the fines fall into a basket-like box. This box has a hinged bottom and can be cleaned out periodically by dropping the bottom.



Screen under bins takes out any fines from gravel before the material falls into truck body

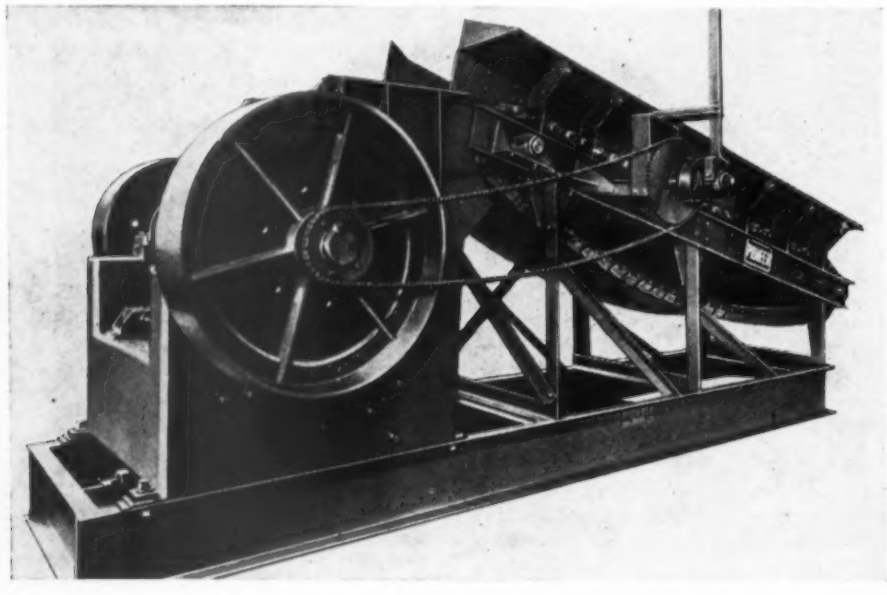
# new MACHINERY

## Unit Type Apron Feeder

PIONEER ENGINEERING WORKS, Minneapolis, Minn., has brought out an apron feeder built around a unit assembly without sideboards. The feeder also can be furnished either with vertical or with flared sideboards, thus making three models available. Each of these models can be furnished with any one of three drives; for gear motor, for conveyor drive, or for drive from the crusher. This provides nine combinations of the feeder, which can be secured in five lengths from 6 ft. to 14 ft., and in four widths from 30 in. to 48 in.

The illustration shows a 14-ft. feeder installed to feed a primary crusher. This heavy duty feeder is arranged for clutch control from an operator's platform. The pans are ½-in. forged steel plate, formed to overlap to impart great strength and rigidity. These overlapping pans, together with the side-boards provide a continuous path for the materials, and reduce spillage. The overlapped pans also provide a corrugated surface which prevents slippage under the load.

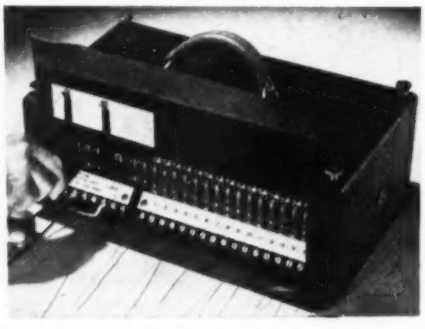
Interlocking malleable castings, bolted to the pan ends, form a continuous wall along each edge of the feeder bed, and further reduce spillage. The pans are carried on heavy chains which in turn are supported on large idler rollers; the rollers being so spaced that heavy impact and shock can cause no damage. The end shafts are of large diameter to give ample bearing surface, and turn in heavy babbit bearings. Grease fittings readily are accessible for adequate lubrication. Cut-steel sprockets reduce maintenance costs and save chain wear. In the side-board models, replaceable wear plates are easily changed. Side-board extensions are available at extra cost.



Showing a 14-ft. feeder installed to feed a primary jaw crusher

## Blasting Timer

E. I. DU PONT DE NEMOURS & Co., Wilmington, Del., has developed an electric blasting timer which makes possible the firing of a series of dynamite charges at predetermined intervals as brief as five-thousandths of a second. Such precise control, it is said, reduces ground vibration, gives greater fragmentation of rock, and promotes safety.



Blasting timer which permits firing a series of dynamite charges at intervals as brief as 0.005 of a second

Blasting often must be done near residential or business areas, and in some cases danger of damage from ground vibration has restricted the size of the blasts and, consequently, their efficiency. With this blasting timer, it is possible to set a series of blasts, up to seven, following so closely upon one another that the vibration is greatly reduced.

The timer consists essentially of a cam shaft driven through a solenoid-actuated clutch by a 110-volt synchronous motor. The shaft operates the contacts for completing 14 individual circuits at various predetermined time intervals. There is an arrangement for closing all contacts when the timer is in the off or "ready" position as indicated at an inspection window. This design not only provides for shorting all external circuits for safety when they are completely wired, but also permits testing each one at the shot prior to final hook-up.

## Flame Failure Safeguard

COMBUSTION CONTROL CORPORATION, Cambridge, Mass., has announced its Fireye photo-electric flame failure safeguard. The instant flame fails, fumes and gases accumulate and combine with air to form a dangerous, highly explosive mixture within the combustion chamber. When this condition occurs, control time is vital. The Fireye photo-electrically "sees" that the flame has failed and instantly turns off the fuel supply and the burner.

The equipment consists of a photo-electric scanner type 45PH5 for monitoring the main oil burner flame and programming control type 24PJ8 for programming the oil pump, oil valve, and ignition system. Flame rod type 45JP1 may be added to this combination to monitor the gas pilot flame.

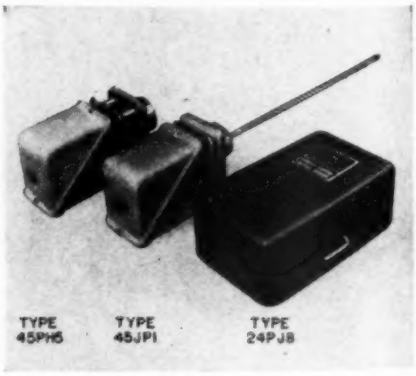
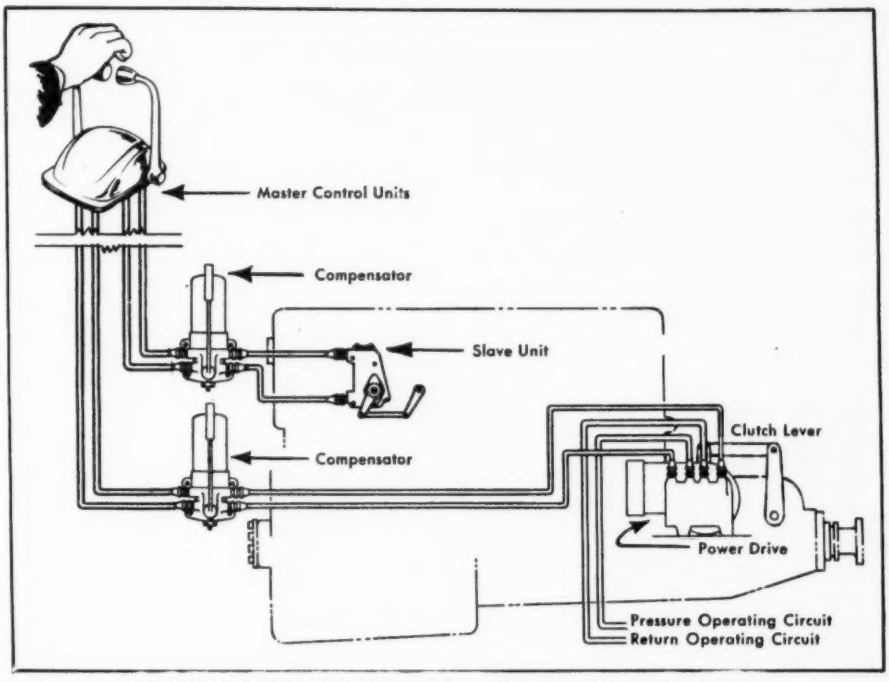



Photo-electric flame controls; left, scanner type for monitoring oil burner flame; center, flame rod type to monitor gas pilot flame; right, programming type for oil pump, oil valve, and ignition system

## Remote Controls

ADEL PRECISION PRODUCTS CORPORATION, Burbank, Calif., has adapted its ISOdraulic remote control systems for many industrial applications, including railroad locomotives and earth-moving equipment. These controls have been used to actuate throttles, clutches and steering mechanisms hydraulically for pleasure craft and work boats. Heavy tractors and other implements are easily controlled by hydraulic pressure systems.

The schematic drawing illustrates two typical applications of these controls; one, the remote manual operation of a throttle, and two, the easily remote operation of a heavy clutch with the power drive unit in which hydraulic pressure does the actual work of shifting.

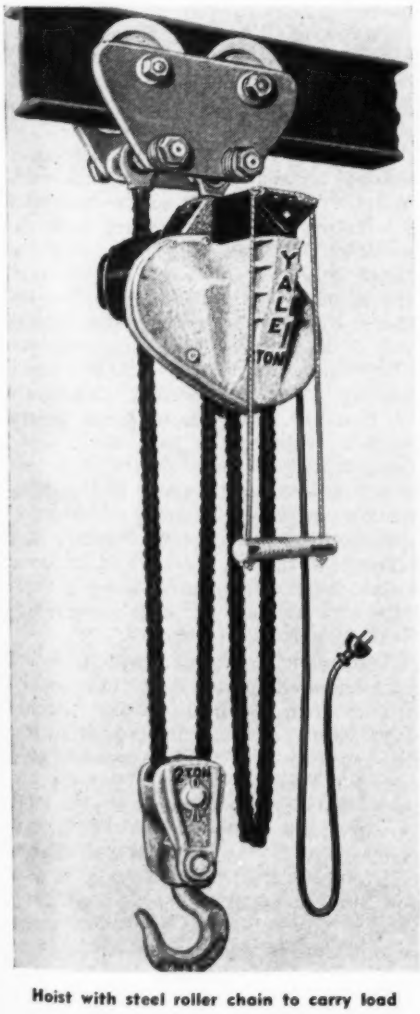



**Typical installation illustrating two applications of hydraulic control**

## Light Electric Hoist

YALE & TOWNE MANUFACTURING CO., Philadelphia, Penn., has added a 2-ton model to its line of Midget King electric hoists. It is light in weight, and is equipped with a 1-hp. motor. Lifting and lowering action is obtained by a flip of the wrist on the one-hand bar-grip control, allowing the hoist operator to have his other hand free to guide the load.

To carry the load, a strong, light-weight alloy steel roller chain is used. Upper and lower limit safety stops prevent overtravel of the hook. The load brake and independently acting motor brake operate whether the power is on or off; both brakes, all wiring, and the controller are totally enclosed. The hoist is available with hook for stationary use and with permanently attached trolley for use on an overhead track. To provide automatic electric cord support and feed when the hoist is used on a trolley, a special device is available.



**Hoist with steel roller chain to carry load**

## Percussion Drill Bit

KENNAMETAL, INC., Latrobe, Penn., has announced a chisel type design percussion bit for drilling holes in hard rock. It has a wear-resistant Kennametal cutting edge, and it is driven by pneumatic percussion drilling machines. It is a cemented carbide bit developed to withstand the impact of air hammers using air pressures of 80 to 120 p.s.i.

**Percussion bit before and after drilling 50 ft. of granite**

The manufacturer reports a total of 50 ft. of holes, 1⅜ in. in diameter, drilled in solid granite with one of these bits before it was taken off the driving rod because of wear. It is claimed that the hole sizes at the end of drilling this many feet of granite were approximately the same as when the holes were started. The new percussion bit drilled the granite at the rate of one foot per minute. It has been used for drilling quartz, silica sand, limestone and other rocks, according to the manufacturer.

## Tight Shipments

NATIONAL ADHESIVES, New York, N. Y., has developed Load-Lok, an adhesive especially designed to keep shipments from sliding about in railroad cars, trucks, and ships. The adhesive is automatically applied in two parallel strips to the bottom surface of each shipping container, which is then lifted off the loading and glueing conveyor and glued to the unitized load.

## Double-Drum Cable Control

CATERPILLAR TRACTOR CO., Peoria, Ill., is now providing a lower cost rear-mounted double drum cable control unit for use with its Diesel D6 and D7 tractors, designated as No. 23. It is designed to develop line pulls ample to meet service requirements imposed by the operation of scrapers, bulldozers and rippers.

## Grease Remover

SPECO, INC., Cleveland, Ohio, is producing an industrial powdered hand soap and grease remover, known as Sopec, which is suitable for use in washroom dispensers or packaged in handy containers. It is said to be hygienically safe, non-abrasive, soothing, and fast acting.

# LABOR RELATION TRENDS

## Pyramiding of Overtime Pay

By NATHAN C. ROCKWOOD

WITH return of peace-time operation, employers are attempting to reduce war-time labor costs by rearranging work schedules to avoid overtime. This leads to clauses in collective bargaining contracts on conditions of employment, which may result in disputes as to their interpretation. Such disputes, according to the usual contract terms, go to an arbitrator or arbitrators for a binding decision.

It would appear from recent cases that labor-union collective bargainers are using more acumen in such contracts than employers, because they have consistently aimed at retaining the same take-home pay as in war time by raising hourly rates. A lot has been said about justification for increased wage rates to take care of the increased cost of living, but behind this screen is expectation of a 35- or 36-hour work week without loss of take-home pay. Obviously, increased hourly rates greatly increase the cost of overtime work, and is especially hard on those industries, like lime and cement, which require 24-hour a day, 7-day a week operation in at least some departments.

### Interpreting "Seventh Day"

Apparently nearly all present union contracts contain clauses similar to the following: "The regularly scheduled work week shall be five consecutive days of work and two days of rest. All work performed on the sixth consecutive day of the work week shall be paid for at one and one-half times the regular rate of pay, and double-time shall be paid for all work performed on the seventh consecutive day of the work week." The question arises as to the meaning of the term "seventh consecutive day of the work week."

In several instances that we have reviewed and studied, the arbitrators appear to have decided the issue against employers largely on technicalities in the exact wording of the clause, depending in some instances on dictionary definitions of terms used, rather than attempting to find out what was in the minds of the signers of the contracts at the time the terms were under discussion.

Employers, naturally, because it was their understanding of the reason for this clause, have tried to interpret it to mean that when an employe had already worked five days, or 40 hours, in any one week, he was to be paid time and one-half for the sixth work day (usually a Saturday) and double-time for work on the seventh work day (usually but not necessarily Sunday).

Not inclined to miss a trick and probably advised by clever lawyers, employes contend the clause means that an employee who works on Sunday, or the seventh day, is entitled to "pyramid" his overtime. In other words, he is to be paid time and one-half for straight overtime plus double-time for his Sunday work; to get the premium both ways. The arbitrator finds that such contract clauses are clear in providing "double-time" for Sunday or seventh day work, and the fact that the employee had at least one day a week off, according to schedule, made no difference.

### Ban on Pyramiding Ineffective

Naturally, some employers have foreseen the possibility of pyramiding overtime pay, and in the case of the Monsanto Chemical Co. (Indian Orhard, Mass., plant) and a C.I.O. United Electrical, Radio and Machine Workers' union, the contract contained a special ban on such pyramiding, which was worded as follows: "In no case shall overtime be paid twice; that is, if the time worked falls under two or more of the overtime classifications, the rate paid shall be the single overtime applicable."

The union's case was that of an employe who had worked six consecutive days, one of which days included premium pay because the worker was called to work outside of his regular shift hours on that day, and the union contended, he was also entitled to premium pay for the sixth consecutive day. The particular clause referred to provided: "Any shift worker called to work at any time other than his regular shift shall be paid overtime for the hours worked outside of his regular shift, unless notified 18 hours in advance."

The difficulty arose when the employee's overtime on his unscheduled shift overlapped into the sixth work day. The union contended this entitled him to both the time and one-half for his unscheduled shift, and also time and one-half for the sixth day, which made the rate, of course, three times the regular hourly rate, the very thing the contract was drawn to avoid.

The key clause in the contract was (in part) this: "Time and one-half shall be paid for all work performed on the sixth consecutive day of work in a regularly scheduled work week. In order to be entitled to this premium rate of pay on the sixth day, the employee must have worked a full shift on each of the five preceding days of the regular work week," except for specified reasons.

The facts were: The worker was scheduled to work a five-day week Monday to Saturday with Tuesday off. He was asked, because of special circumstances, to work an additional shift after completing his regular Monday's shift, which ended at 11:00 p.m.; he worked until 7:00 a.m. Tuesday, receiving time and one-half.

The arbitrator held "that the premium pay for the hours worked in excess of eight in any 24-hour period may not be counted against overtime due for the sixth consecutive day worked, so long as each premium is due for a separate and distinct day. The contract clause in regard to the duplication of overtime pay definitely refers to two or more classifications for overtime worked on one day."

In a case involving the Pittsburgh Plate Glass Co. and the Libbey-Owens-Ford Glass Co. and the Federation of Glass, Ceramic and Silica Sand Workers of America (C.I.O.) the arbitrator decided that pyramiding for Sunday work was permissible under the terms of the union contract, although the companies had purposely tried to reschedule their work weeks to avoid overtime (and, according to the arbitrator, they could legitimately do this, since it was not prohibited in the contract).

The overtime clause read: "A normal work week shall be 36 hours. No employee, except as herein provided otherwise, will be required to work more than 40 hours nor more than six days in any scheduled work week, nor more than eight hours in any 24-hour period without payment of overtime." It provided further that: "Employes who are working on a regularly scheduled day of eight hours or more shall receive time and one-half for the sixth consecutive day worked in the scheduled work week." There was also the usual provision that Sundays (and certain other days named) are regarded as holidays, and except in the continuous processes, and for such repairs as are essential to factory operation, work will be avoided. Overtime will not be paid for these holidays for work required in the continuous processing, or for repairs of an emergency nature essential to factory operation, except for Christmas Day (and other named holidays, not mentioning Sundays). If, however, emergencies arise where work on Sundays or any of the holidays stated is required to fill emergency orders, or to avoid hiring temporary employes during the rush season, it is agreed that Sunday and holiday work may be carried on provided overtime is paid on such Sundays and holidays for this emergency work in getting out orders."

The union maintained that its members engaged in non-continuous operations, when required to work on Sundays, were entitled to overtime for all hours in the week exceeding 40, plus the overtime pay for Sunday, as such. This position was sustained by the arbitrator who ruled: "That the contract as it is written is possible of construction that overtime pay is due for Sunday when it is the sixth consecutve day following a 40-hour week in addition to overtime due for Sunday as such, it being a holiday, and so provided for in the contract."

# Instrumentation and Control

## for Automatic Gas Producers

### Part 3: Methods and equipment for proper control

By VICTOR J. AZBE

A GAS PRODUCER, such as a R. D. Wood or Wellman-Seaver-Morgan type, has the rather high gasification capacity of 50 tons of coal per day or even more. While this high rate justifies a rather complete control arrangement, most producers are regulated by manual means. While a conscientious operator can still do a good job, constant attendance is necessary, and automatic regulation is to be preferred. It is particularly desirable where the producer operates at close to its capacity because with automatic control something more will always be obtained.

It is also desirable since then the producer operator can be given other duties; for example, he could leave to help the kiln fireman trim the kilns if the producer is under automatic control. In most plants this would save three men, about $5000 to $7000 per year in labor alone, without considering the value of the fuel saving due to greater regularity and the value of additional capacity.

Gas producer operation is controlled, with respect to capacity, by the blast pressure providing desirable gas main pressure. Gas temperature is controlled by the fuel feed, while clinker is avoided by the admission of either steam or of $CO_2$ containing kiln gases. All of these if desired can be controlled automatically.

"Gas Control" is the most important of the three. As it does not seem possible to work the system out to assure absolute control of gas quality produced, the recommended method is to maintain a constant main pressure. The pressure which counts in this respect is not that at the producer but rather somewhere among the kilns down the line of the flue so as to reduce as much as possible the back pressure effect of the collecting soot.

The gas pressure, which may be anything desired up to 2 in. would actuate the automatic system and through it regulate the damper on the discharge of the gas producer blower; that is, control would vary through producer blast pressure which in too many plants is now maintained at a constant point regardless of the ash bed thickness or its resistance.

Under this system if the amount of gas to one kiln would be reduced or possibly entirely cut off, the main pressure would rise temporarily but controls would immediately bring it back again to the pre-set normal. Thus, the remaining kilns on the line would continue to obtain the gas at the normal rate.

Gas control could also be established through regulation of the blast from the pressure drop across an orifice in the producer fan inlet. This would tend to give a more constant quantity of gas as the amount of air admitted means amount of gas. However, while this system would appear as more logical, the other regulation by main pressure control is more practical and lends itself to better use, when there are three or more kilns on the line.

"Coal feed control" is obtained by gas temperature. Fig. 3 shows a section of a temperature chart where such control was exercised. The control was set for a temperature of 1575 deg. F., and maintained it very well by varying the notches of coal feed from two to seven. At points *M* temperature would rise some, but at these the fireman had the producer and so the coal feed was stopped to measure the bed. This was done once every hour, but as noted on starting, the temperature was brought quickly back to normal.

A producer with such a constant feed rate will give the most uniform gas. Under hand control this is not possible. Temperature may rise to higher levels, then suddenly large quantities of coal may be fed to bring it down, this results in undue quantities of extra rich gas, something for which the kiln draft may not be adjusted and the kiln can not take care of.

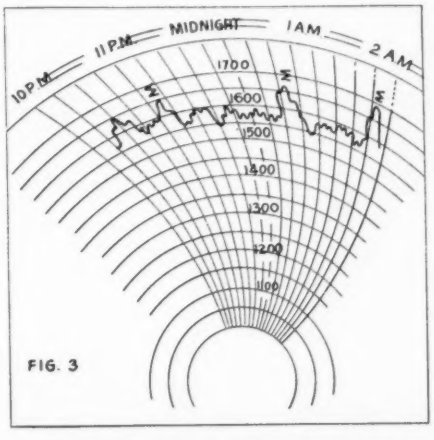


FIG. 3

Fig. 3: Section of temperature chart

It should be remembered that the gas from gasification of fixed carbon in the gas producer bed has only a heat value of about 150 B.t.u. per pound, while that from distillation of the volatile matter is over 550 B.t.u., and as from 30 to 40% of the heat in the coal is from the volatiles a rather steady coal feed into a zone of fairly constant temperature seems quite important.

The last control is admission of the endothermic agent to the bed to minimize the temperature of its oxidation and gasification zones. This is the hot spot in the vertical section of the gas producer bed. The hotter it is, the better gas is being made and the higher the producer capacity will be, but if too hot clinkering will result. Either steam or $CO_2$ is therefore used; the latter from the kiln gases of the kiln, which by weight on an excess-air-free basis are about 50% $CO_2$.

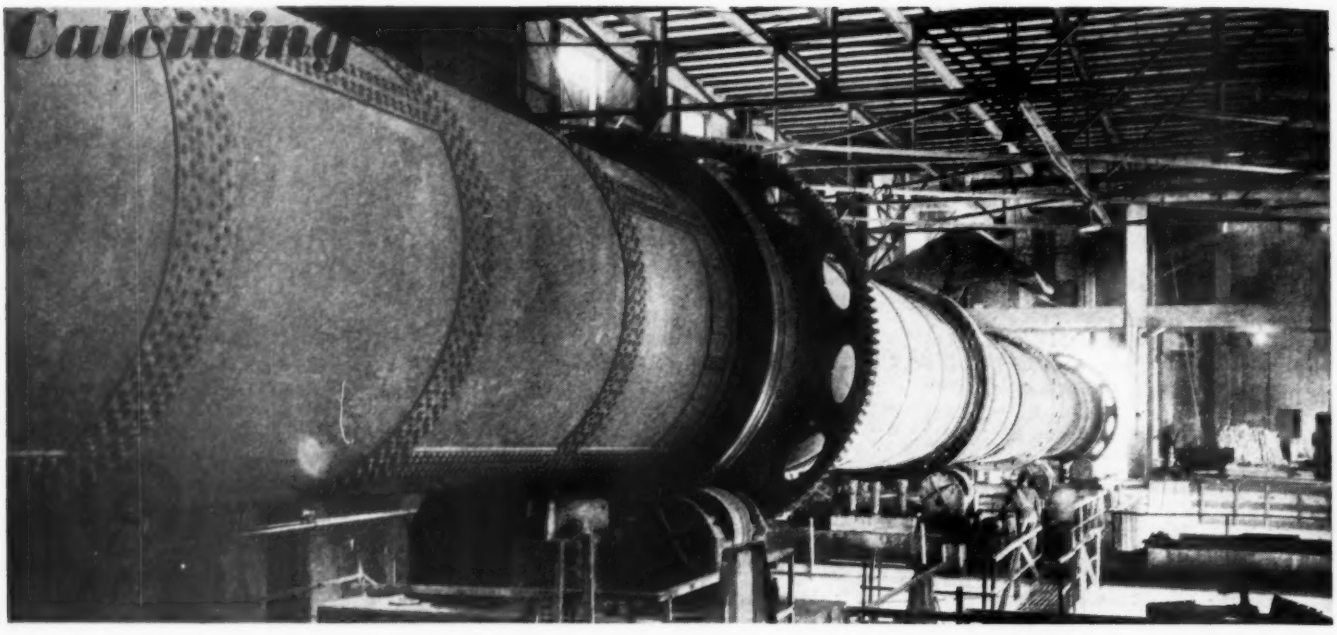
Evaluation of the amounts of these tempering agents used is, in the case of steam, by calculating moisture saturation to which the gas producer air supply is brought, and in the other by determining the $CO_2$ content in percent by volume present in the producer blast. When coal is good, the desired saturation for good results is 120 deg. F. or a $CO_2$ content of 4%.

But the tendency of the fireman is to avoid the clinkers which cause him trouble rather than to get the most out of the plant so often he may operate at 140 deg. F. or 7% $CO_2$ content which definitely is a poor operating condition, tending to impair performance in several ways. Also when fluctuations occur he will be too slow to correct them.

When steam is used as a tempering agent, automatic control is very simple; through a thermostat in the blast line, admission of steam is regulated for any desired saturation temperature.

Automatic control of $CO_2$ is not so simple; first, a $CO_2$ recorder is needed which in itself may be sufficient as main line $CO_2$ variations are slight and hand adjustments are not too frequently necessary.

*Azbe Engineers, Inc., St. Louis, Mo.



Two of the old kilns were connected together by a connecting butt strap to make one of the longest kilns in America

# Long Kiln Saves Fuel—Improves Clinker

## Lawrence Portland Cement Co. converts two short kilns into single rotary 356-ft. long, securing more uniform product

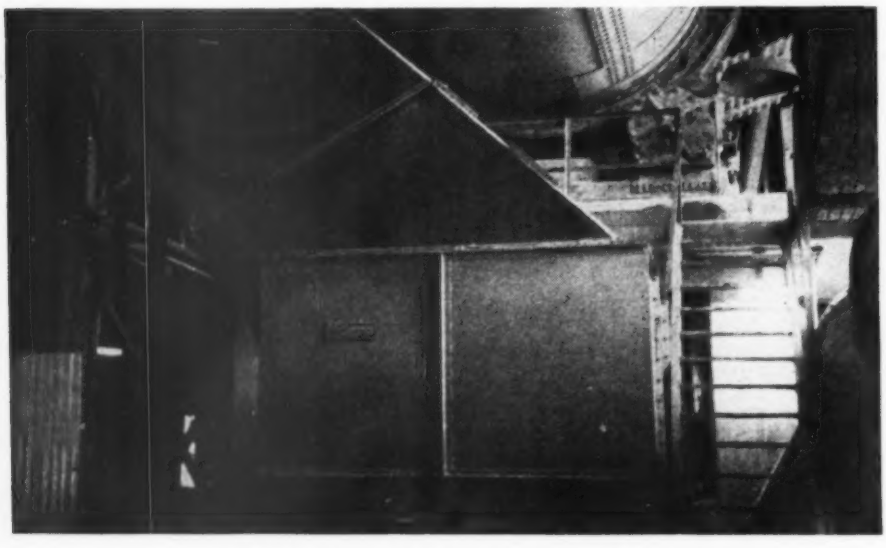
By BROR NORDBERG

AS EXPERIENCE with long rotary kilns in cement manufacture is gained it becomes increasingly apparent that improvement in the properties of the clinker accompanies the heat efficiency for which kilns over 300 ft. in length are being installed. Plants that have converted to long kilns are, of course, able to draw quality comparisons based on past performance with the same raw materials clinkered in shorter kilns. Greater uniformity of product, doubtlessly due in part to the more thorough intermixing of raw materials through a long kiln is claimed. The meticulous control found necessary to the successful operation of the larger, more sensitive kilns also is being reflected in the product.

A very excellent clinker has resulted at the Thomaston, Maine, plant of Lawrence Portland Cement Co., since two 11- x 200-ft. rotary kilns were converted into one 356-ft. kiln of the same diameter. This single kiln was estimated to accomplish a fuel saving corresponding to not less than 25 lb. of coal per barrel as received when operated at a capacity of 2600 bbl. per day. This fuel saving has fully been made not only at 2600 bbl., but at a somewhat higher capacity.

The average capacities of the 11- x 200-ft. kilns in 1940-1941 were approximately 1550 bbl. from each kiln with a corresponding average fuel consumption of 110 lb. of coal per barrel as received. This fuel consumption has now for the long kiln been reduced to between 80 to 85 lb. of coal per barrel.

This kiln differs in several respects from others in the industry. It is probably the longest kiln to be fed filter cake and undoubtedly is the first to utilize heat exchanger chains in combination with filter cake feed. The fact that the kiln is fired with natural draft is unconventional.



Showing relation of clinker cooler to long kiln

### Plant Layout

Cement has been manufactured at Thomaston since 1927 by the wet process. Originally, each of the two 11- x 200-ft. kilns was equipped with a 10- x 90-ft. rotary cooler and both were fired by pulverized coal from a bin system. In 1928 the average coal consumption was about 138 lb. of coal per bbl. In 1929, after slurry filters were installed, the fuel consumption was reduced to approximately 120 lb. of coal per barrel and in 1940 after

direct-firing Raymond coal pulverizers were installed, the fuel consumption was reduced to the 110 lb. of coal per barrel as mentioned before.

### Long Kiln Installation

Work started on the joining of the two kilns in June, 1944, principally to achieve a considerable reduction in coal consumption, and the long kiln has now been operated approximately one year. F. L. Smidth & Co. was consultant on the project. The problems involved and the actual work required in the transition were described in ROCK PRODUCTS, April 1945, pp. 66-68. Aside from considerations involving the kiln itself, the only other related major installation was substitution of a Fuller inclined movable grate clinker cooler for the two rotary coolers.

Each of the two Raymond unit-firing coal mills had sufficient capacity to fire the long kiln, so alternate blow pipes were provided so either mill may fire the kiln while the other is stand-by. Each of two Oliver disc filters had an overcapacity for a 200-ft. kiln, yet insufficient for present production, so a belt conveyor was provided to permit both filters to serve a single water-cooled feeder pipe. Synchronization of the two ferris wheel feeders was essential. Description of the kiln, control devices and methods of operation follows.

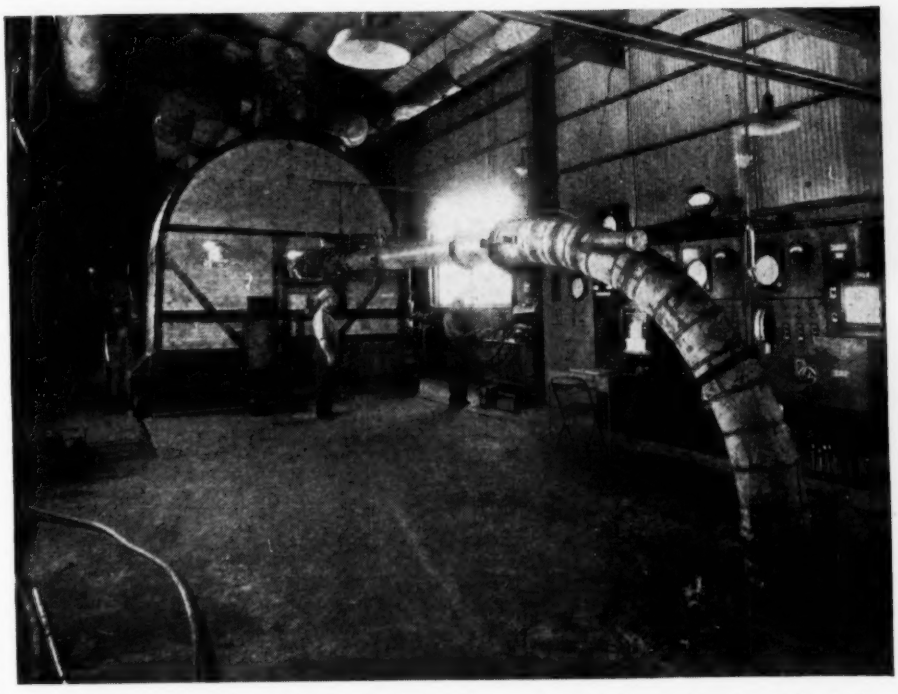
### Kiln

The two original kilns (Allis-Chalmers) as joined into one of 356-ft. length, ride on seven tires with a dual drive through two 75-hp. slip ring motors in parallel. The drive hookup, with separate controls tied mechanically, provides for operation from the control board, with equal division of the load between the motors at any speed. Required connected horsepower is less than 100, but expediency necessitated utilization of the existing motors. Four stages of reduction to the ring gears at the third and sixth piers complete the drive. Eleven speed points in the drive circuit allow varying the kiln speed between the limits of 25.5 r.p.h. and 56.3 r.p.h. There is a cable reel tie, through a spider arrangement, between the motor drive nearest the feed end and the ferris wheel feeders delivering slurry into the filter tanks, to synchronize feed with kiln speed. Slope of the kiln is ⅜ in. per lineal ft. Turning speed is held at the highest point.

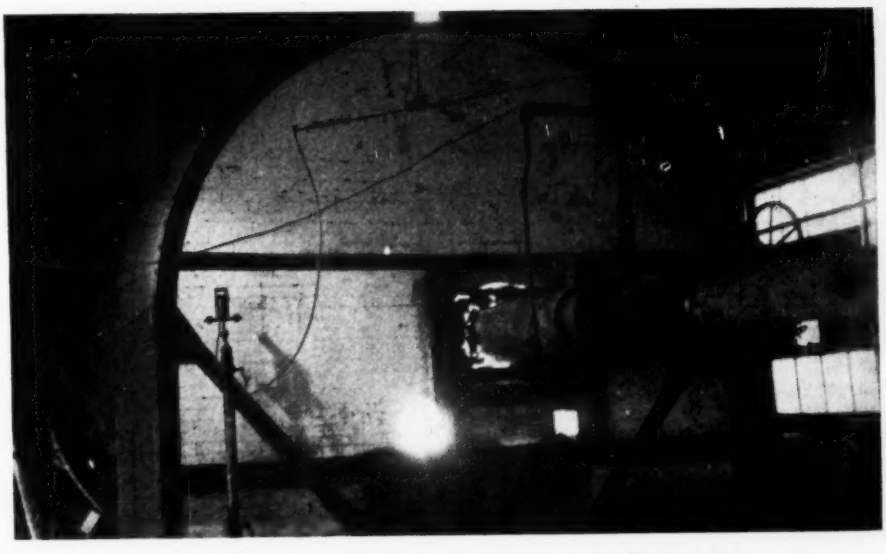
### Kiln Lining

Lawrence Portland Cement Co. was one of the first companies in the industry to use magnesite, basic hot zone brick for kiln lining.

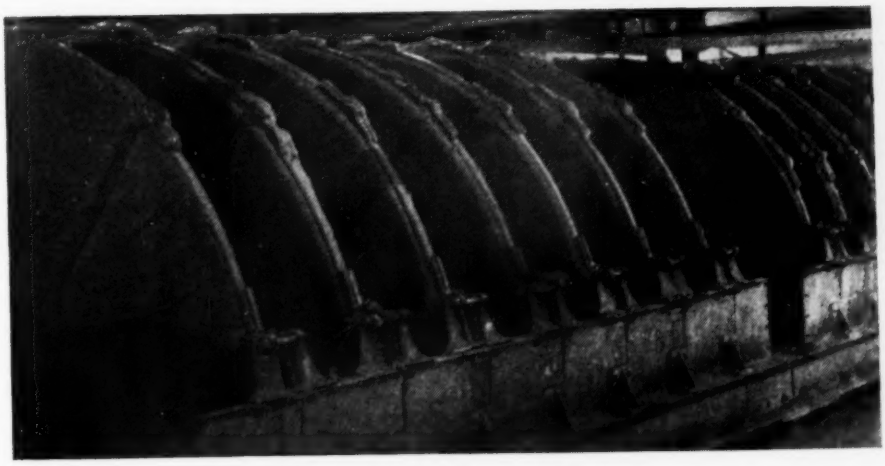
The long kiln is lined for its entire length with 6-in. brick but is not insulated. Starting from the nose ring there is 8 ft. of 70 per cent high alum-



**Control board to the right and long pipe leading from coal mill, below, to kiln. Note plug in floor to second stand-by coal mill**



**Hood of long kiln which was assembled from two old kiln shells**



**One of two slurry filters serving the long kiln**

ina brick followed by 33 ft. of magnesite brick in the sintering zone where temperatures are held at 2700-2800 deg. F. Then follows 66 ft. of 70 per cent alumina brick, 115 ft. of 50 per cent and the balance of 40 per cent or 50 per cent alumina. Brick in the back end are of high wear resistance type, with low coefficient of expansion, to withstand the more rapid temperature changes occurring in the back end of the kiln. Abrasion from the heat exchanger chains is a factor considered in brick selection.

Practice is to build an 8- or 10-in. coating on the lining to protect the magnesite brick, which is far thicker than could be maintained with high alumina brick, according to experience at this plant. Magnesite brick being a good conductor of heat, comparatively, the uniformity of heating throughout the brick to the kiln shell is suggested as a possible factor in extending the life of the brick.

### Operation

Uniformity of raw material is a factor in the uniformity of product from long kilns, due in part to thorough intermixing within the kiln, but also because thorough blending is generally done in connection with long kiln operation. The quarry at Thomaston is a difficult one to operate due to wide variations in composition; but, through continuous prospecting, selective quarrying and thorough blending, the raw mix is brought to a uniform holding point.

The stone is classified as high, middle and low lime rock, occurring within the quarry in all manner of variations and locations. Separate slurries are made from the three grades of stone, as classed according to lime composition. High lime rock varies from 43.5 to 56.1 per cent CaO and the lowest is approximately 25 per cent CaO, 43.1 per cent being about the analysis desired. Low lime rock ordinarily contains the necessary silica, iron and alumina components. Occasionally high silica sand must be brought in from the outside for interblending.

There are 12 slurry tanks. The separate slurries are mixed in definite ratios, transferred into correction tanks, re-pumped into empty tanks for inter-mixing, sampling and further correction before the final slurry is pumped to the feed basin. Selection of rock in the quarry is governed by the needs of the mill, analyses starting at the raw mills themselves. Fineness of grind, through two Allis-Chalmers compeb mills is 90-92 per cent through 200-mesh. Output of the kiln, given earlier, is measured by the raw material input to the kiln—630 lb. per bbl.—clinker being conveyed from the Fuller cooler by conventional chain conveyor direct to storage.

Operations preceding the actual burning of clinker are essentially the same as they were when the plant was built. Raw grinding capacity has been the limiting factor in plant capacity due to the variables in the quarry which have necessitated tedious selection. The entire quarry operation now is under re-development to increase capacity available to the mill.

Slurry filters installed in 1930—importantly contributing to fuel conservation—reduce moisture from 38 or 39 per cent to an average of 18.6 per cent, in converting slurry to filter cake.

The use of F. L. Smidth heat exchanger chains in the kiln, in connection with a filter cake feed presented some mechanical problems. Chain section is limited to 14 ft. of kiln length, for the reason that kiln feed is dried far back in the kiln. Chains have a short length of kiln in which to be operative with filter cake feed, but conservation of fuel, in every way, is of extreme importance at Thomaston due to high cost of the coal delivered at the mill.

Lifters were devised to precede the chain section since considerable difficulty was experienced from the damming up of feed behind the chains. Feed would build up to the extent of overflow out the back end of the kiln, at times releasing in surges that proved very costly in their effects on liner life far ahead in the sintering zone.

The lifters, plates of 18- x 30-in. mild steel, were installed ahead of the chains in an arrangement to guide and accelerate the movement of filter

## Directions for Marking Each Hour, The Report on the Reverse Side of this Sheet

| | | | |
|---|---|---|---|
| NOSE RING | Mark | F | When ring begins to form. |
| | Mark | G | When ring is building up. |
| | Mark | P | When ring is poked out. |
| | Mark | N | When there is no appreciable ring |
| | Mark | H | When ring is high and should be punched |
| BACK RING | Mark | F | When ring is first noticed as beginning to form. |
| | Mark | P | When ring is being barred out with water poker |
| | Mark | HP | When kiln is being heated up after using water poker |
| | Mark | CF | When chunks are falling out of ring from either poking or other cause |
| | Mark | S | When kiln sheds all of the back ring either from poking or otherwise |
| | Mark | N | When there is no back ring |
| | Mark | GB | When back ring seems just right for good burning, not reducing production |
| | Mark | X | When ring is too big, interferes with production and should be poked out |
| BARE SPOTS | | | Write description, location and extent of bare spot when lining shows from coating dropping off |
| | Mark | F | When bare spot first develops or is noticed. |
| | Mark | C | When attempting to cover with mix. |
| | Mark | CG | When bare spot is covered by use of cement gun |
| | Mark | N | When there are no bare spots or when bare spot has been successfully covered. |
| | Mark | G | When and if bare spot is increasing in size or depth |
| | Mark | L | When bare spot is being successfully covered and is growing smaller. |
| | Mark | R | When RED SPOT shows up on kiln shell, describing in writing size, location, etc. |
| KILN SPEED | Mark | – | For each hour an average point of speed for the hour's run |
| | Mark | S | When speed is steady for the hour with no change, when speed is changed 2, 3, 4, or more times mark it S–2, S–3, S–4 or S– (No. of times chang.d) |
| KILN ON LOW SPEED | | | If kiln speed controller is on 5 points or less mark as follows |
| | Mark | W | When kiln is on wet feed |
| | Mark | M | When mix is not right. |
| | Mark | C | When coal is not right. |
| | Mark | P | When kiln has been down for poking ring |
| | Mark | MT | When mechanical trouble slows down or is responsible for slowed down speed. |
| AUXILIARY PRIMARY AIR | Mark | D | When auxiliary air is not being used. |
| | Mark | O | When auxiliary air is being used. |
| COOLER | Mark | C | When excessive amount of chunks that have to be broken up, are coming through. |
| MIX | Mark | N | When mix seems normal and a good burning mix. |
| | Mark | H | When mix is hard burning |
| | Mark | S | When mix is soft burning. |
| | Mark | I | When mix seems to be irregular in burning, changeable. |
| | Mark | W | When filters are down and slurry is feeding direct to kiln |
| COAL FEED REGULAT'R | Mark | S | When regulator can be kept steady on one setting. |
| | Mark | V | When regulator has to be changed to variable setting. |
| RANGE OF SETTING OF REGULATOR | Mark | | 3-4-5-5½ etc., whatever the regulator may be, under the "S" when the regulator setting is steady when the setting has been varied mark under the "V" the range of variation as for instance 5½-6, 4-7, etc., etc. |
| FILTER CAKE | Mark | N | When cake is normal, W—when cake is wet, T—when cake is too thin |
| DUST CHAMBER | Mark | | Temperature shown at feed end of kiln as indicated on recording chart |
| KILN BASIN | Mark | H | When basin is nearly full. |
| | Mark | M | When basin is approximately half full. |
| | Mark | L | When slurry in basin is low. |
| | Mark | A-A | When automatic air agitator only is turned on. |
| | Mark | T-A | When air is on all the time and automatic air valving not being used |
| ELECTRIC EYE | | | Record temperatures shown on indicator. |
| KILN DAMPER SETTING | | | Mark Damper settings as shown on chart for Indicating meter on control board. |
| MECHANICAL TROUBLES | | | Write in what the mechanical trouble is and mark for the hour D and D½, D5 and so forth for each fractional hour kiln is down. |
| GAS ANALYZER | | | Record readings as shown on the CO-H2 and CO2 Indicating meters. |
| LITER WEIGHT | | | Record weights as found on the liter weight tests made. |
| WIND | | | Record direction and indicate velocity as Light, Moderate, Strong, Gale, etc. |
| DRAFT GAUGE | | | Mark reading of gauge each hour. |

**Reverse side of kiln operator's report with directions for use**

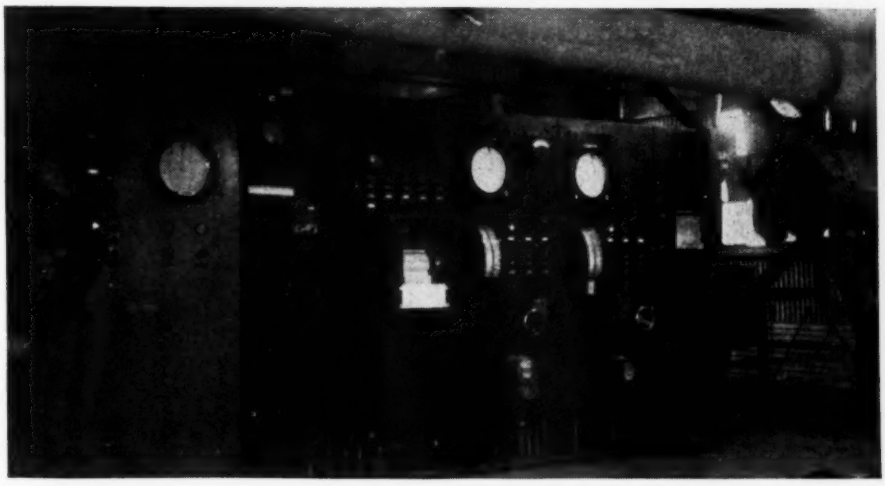
cake into the chain section. The plates were fastened on end at a slight angle around the inside circumference of the kiln, staggered in four rows consecutively. With the action of a screw conveyor, the cake literally is pushed forward to overcome the resistance of the chains. The lifters start 3 ft. from the back of the kiln and extend for a length of 10 ft., with a 6-in. clearance ahead of the chains.

The kiln is fired by a short, intense flame, in contrast to the long, lazier flame employed in some long kilns, but experimentation on flame length is by no means complete. Pre-heated air is drawn from the kiln hood into the unit mill, bleeding in sufficient cool air to attain a temperature of 350-400 deg. F. at entrance to the mill. Coal is pulverized 97 per cent minus 100-mesh and the coal-primary air mix is automatically held at approximately 190 deg. F. as injected into the kiln. Secondary air is preheated through the clinker bed in the cooler, in the conventional way. Both the burner pipe and the feed pipe for raw material are water-cooled, and the hood of the kiln is sealed. A 225-ft. brick-lined concrete stack provides sufficient draft to overcome resistance to the flow of gases through the kiln without induced draft fan.

## Controls

Great dependence is placed upon the burner's skill in holding kiln conditions that are reflected in uniform, hard-burned clinker, instruments serving mainly as indicators in the detection of abnormal operation. Here, as in the experience at other plants, the large kiln has proved a sensitive apparatus, that may easily be thrown out of balance and with proportionate difficulty to bring back into adjustment should the delicate control be lost. In the shorter kilns, time of travel through the kiln was relatively unimportant, but with the long kiln, variations in the back end of the kiln show their effects three hours later.

Gauges and other instruments, few by comparison with most other kilns exceeding 300 ft. in length, serve as indicators to the burner and facilitate his work. A Leeds-Northrup optical pyrometer, one of the principal instruments, serves to indicate and record kiln temperature at one set point but, due to smokiness or excess dust from the cooler below, its principal value is in the detection of radical changes. If all gauges read correctly, the burner is saved much effort, but, if some indicate off readings, his attention is quickly called to factors in operation responsible for those variances. A further improvement is the use of the "electric eye" to record continuously the temperature at one point in the burning zone.



Instrument board for controlling kiln operation

According to those responsible for production, the experience the burners had in operating shorter kilns might just as well have been completely forgotten, for its value in firing a long kiln. Men of high caliber, capable of understanding the effects of oxygen changes, variations in feed and other factors bearing on combustion and the ultimate product are needed for long kiln operation.

Burning, while the crucial factor in kiln operation, depends upon the consistant uniformity of raw mix. Given uniform fineness and correct chemical composition, it is the burner's responsibility to make good clinker. His ability to make acceptable clinker is thoroughly checked by tests in the laboratory made from frequent samples, and is used to classify the clinker. Hourly samples and pat tests are made supplemented by liter weight tests to determine hardness of burn. Good clinker is uniformly small, with a sparkly, greenish black texture. Reproduced herewith, the operator's report on kiln performance and the directions for marking the report each hour, serve to emphasize the great responsibility invested in the burner for complete kiln operation.

Theory of operation is to hold the kiln speed and rate of feed constant —at the highest practicable level— and make necessary changes in the draft and firing rate according to variations that occur. Draft dampers, provided both front and back, are the most important control devices. The temperatures of the gases leaving the 11- x 200-ft. kilns varied normally

(Continued on page 116)

OPERATOR'S REPORT ON KILN PERFORMANCE for 24 hours beginning 7.00 A. M. 194

| | 7-8 | 8-9 | 9-10 | 10-11 | 11-12 | 12-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 | 7-8 | 8-9 | 9-10 | 10-11 | 11-12 | 12-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A.M. | | | | | | | | P.M. | | | | A.M. | | | | | | | | P.M. | | | |
| NOSE RING | | | | | | | | | | | | | | | | | | | | | | | | |
| BACK RING | | | | | | | | | | | | | | | | | | | | | | | | |
| Remarks | | | | | | | | | | | | | | | | | | | | | | | | |
| BARE SPOTS | | | | | | | | | | | | | | | | | | | | | | | | |
| Remarks | | | | | | | | | | | | | | | | | | | | | | | | |
| KILN SPEED | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW SPEED | | | | | | | | | | | | | | | | | | | | | | | | |
| AUXIL'RY PRIMARY AIR | | | | | | | | | | | | | | | | | | | | | | | | |
| COOLER | | | | | | | | | | | | | | | | | | | | | | | | |
| MIX | | | | | | | | | | | | | | | | | | | | | | | | |
| COAL FEED REGULATOR RANGE OF SETTINGS ON REGULATOR | | | | | | | | | | | | | | | | | | | | | | | | |
| FILTER CAKE | | | | | | | | | | | | | | | | | | | | | | | | |
| DUST CHAMBER | | | | | | | | | | | | | | | | | | | | | | | | |
| KILN BASIN | | | | | | | | | | | | | | | | | | | | | | | | |
| ELECTRIC EYE | | | | | | | | | | | | | | | | | | | | | | | | |
| KILN DAMPER | | | | | | | | | | | | | | | | | | | | | | | | |
| MECHANICAL TROUBLES | | | | | | | | | | | | | | | | | | | | | | | | |
| Remarks | | | | | | | | | | | | | | | | | | | | | | | | |
| GAS ANALYZER $CO + H_2$ | | | | | | | | | | | | | | | | | | | | | | | | |
| GAS ANALYZER $CO_2$ | | | | | | | | | | | | | | | | | | | | | | | | |
| LITER WEIGHT | | | | | | | | | | | | | | | | | | | | | | | | |
| WIND | | | | | | | | | | | | | | | | | | | | | | | | |
| DRAFT GUAGE | | | | | | | | | | | | | | | | | | | | | | | | |

Meter R'd'gs — 1st Shift Kiln ____ R'ch'n Scale ____ Slurry ____ Sig. ____ Burner ____
2nd Shift Kiln ____ R'ch'n Scale ____ Slurry ____ Sig. ____ Burner ____
3rd Shift Kiln ____ R'ch'n Scale ____ Slurry ____ Sig. ____ Burner ____

Kiln operator's report which provides a close check on burning conditions

Looking down into quarry, showing truck being loaded by Diesel shovel

# Two Men Operate Crushing Plant

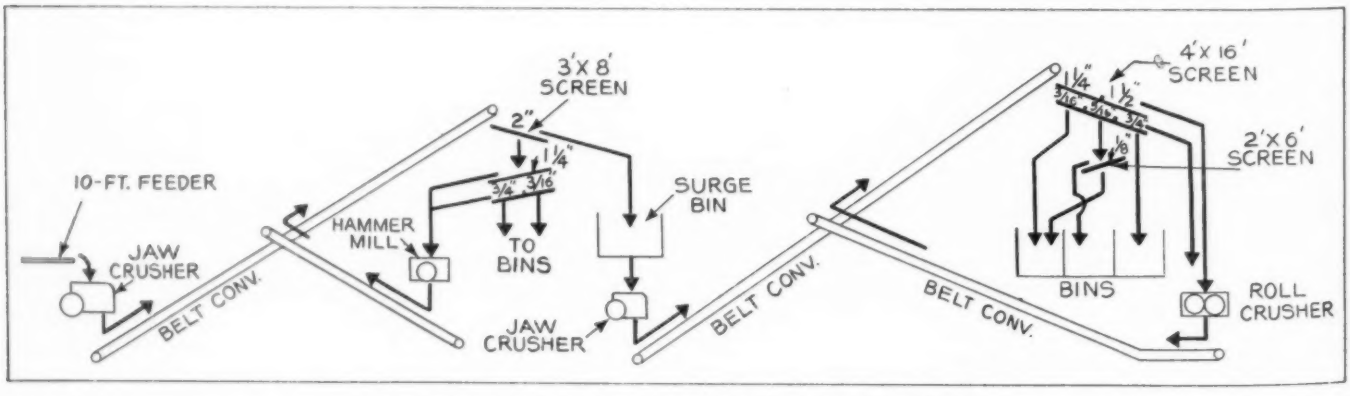
## Radcliff & Berry, Inc., operate crushed stone plant having three stations with closed circuit flow from screens to crushers

CRUSHED STONE production started at the new plant of Radcliff & Berry, Inc., Orleans, Ind., in August, 1946. Designed by the Austin-Western Co., in conjunction with Albert Berry, president of the company, the plant consists of three stations and closed circuit flow of stone from screens to crushers. Efficiency in operation and design permit operation with only two men, one at the feeder in the primary station and one to make a circuit of the crushers and screens.

The simple but efficient flow of material through the various stages is shown in the accompanying flowsheet. Trucks carrying stone from the quarry move up a ramp at the plant to discharge into a 12-ft. apron feeder which can handle the load from two trucks at one time. Stone is fed into a 25- x 40-in. Austin-Western jaw crusher for primary reduction. All equipment in the plant, with the exception of one hammermill and the screens, is of Austin-Western manufacture.

The primary crusher discharges to a 30-in. belt conveyor, 132 ft. centers, for delivery to the secondary station. Here the stone is scalped over a 3- x 8-ft. single-deck Seco screen equipped with 2-in. square openings. Plus 2-in. stone drops into a surge bin and minus 2-in. stone is rescreened on a 4- x 16-ft. double-deck Seco screen, with 1¼-in. square openings on the top deck and ¾- and 3/16-in. square openings on the split lower deck. Stone passing the 3/16-in. openings on the lower deck is stored as agstone and that passing the ¾-in. openings is placed in bins as road stone. The product retained on both decks is chuted to a 24- x 30-in. Stedman hammermill. From the hammermill, the stone is returned in closed circuit to the first belt conveyor by an 18-in. belt conveyor, 88 ft. centers.

Plus 2-in. stone sent to the surge bin is recrushed in a 10- x 36-in. jaw crusher, immediately below the bin. This crusher discharges to a 24-in. belt conveyor, 132 ft. centers, that feeds a 4- x 16-ft. double-deck Seco screen superimposed above bins at the third station. The top deck is split, with the upper half equipped with 1¼-in. and the lower half with 1½-in. square openings. The lower



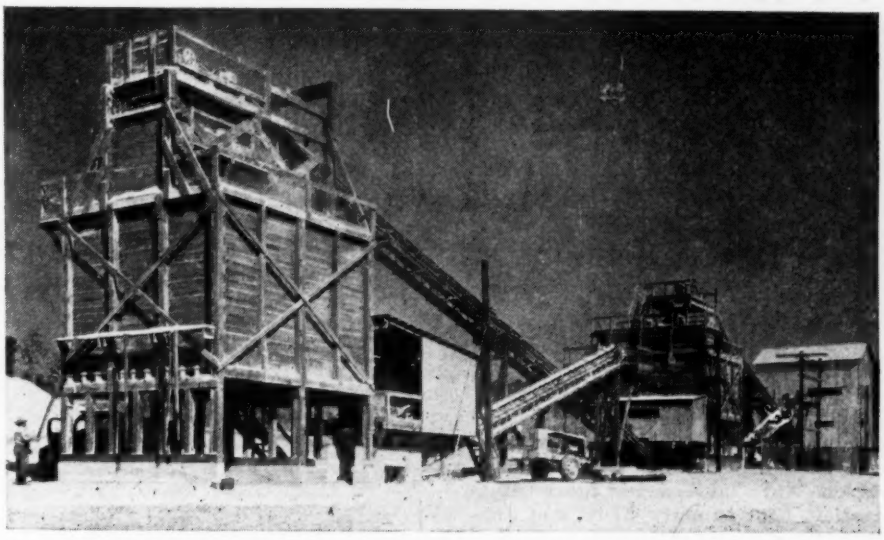

Flowsheet of material through plant from primary crusher to finished sizes

deck is also split, with 3/16-in. square openings on the upper third, 5/16-in. on the middle third, and ¾-in. on the lower third. Stone retained on the upper and lower decks is recrushed in a 22- x 40-in. roll crusher and returned to the belt feeding the screen by a 24-in. belt conveyor, 80 ft. centers, in closed-circuit. Minus 3/16-in. stone is stored as agstone and the minus ¾-in. product is sent to a bin as road stone. The product passing the 5/16-in. mesh is rescreened over a 2- x 6-ft. single-deck Niagara screen equipped with ⅛-in. square openings. Minus ⅛-in. stone goes to the agstone bin and the product retained on the screen goes to another bin.

Bins at the second and third stations, each with a capacity of 200 tons, are divided into three compartments. Sizes stored at the secondary station include: agstone, ¾-in. stone, and plus 2-in. stone (in the surge bin). Similar storage at the third station includes: agstone, ¾-in., and 5/16-in. stone. When bins are full, stone is hauled to stockpiles by trucks loaded from stockpiles by a Barber-Greene loader.

Purchasing the property of the A. T. and C. Stone Co. in February, 1946, Radcliff and Berry, Inc., operated the old plant which had been in existence since 1922, until the new plant could be erected. The deposit consists of a high-calcium content limestone covered with overburden averaging 8 ft. The overburden is stripped with a No. 362 Marion air-controlled Diesel shovel having a 1½-cu. yd. bucket or another No. 331 Marion shovel with a ¾-cu. yd. bucket. The 60-ft. face is drilled in benches, from 6 to 10 ft., since this company believes the stone breaks better and bunches better than if the whole face were shot at once. A Cleveland wagon drill supplied with air by a Sullivan compressor and driven by a D-13000 Caterpillar Diesel is used for drilling.

Three 5½-ton pay-load trucks are loaded in the quarry by the No. 362 Marion shovel. Three trucks, one Ford and two Diamond T with Hercules heavy-duty rock bodies, are sufficient to keep the plant supplied.



Superimposed above bins, to the left, are two screens that produce three finished sizes of stone. Oversize is recrushed and returned to screens in closed circuit. At the extreme right is the primary crushing station

It is of interest to note that the method of operation permits a perfectly clean product to be produced at the third station. Although the stone delivered to the plant is comparatively clean, some overburden and foreign material may be included in the load. By scalping at the secondary station, only the plus 3-in. stone is sent to the third station for processing. Any dirt or foreign material passes through the 2-in. openings on the screen. The minus 3/16-in. stone produced at the final station is trucked to the concrete brick plant located on the property, thus assuring the production of sound, clean products at this factory.

Electric motor units for the various equipment include: 25- x 40-in. jaw crusher, 100-hp.; Stedman hammermill, 200-hp.; 10- x 36-in. jaw crusher, 75-hp.; 22- x 40-in. roll crusher, 150-hp.; conveyors, each of 10-hp.; each screen, except 3- x 8-ft. and 2- x 6-ft., 10-hp. motors; 3- x 8-ft. screen, 5-hp.; and 2- x 6-ft. screen, 3-hp.

Safety was a consideration in the construction of this plant. All catwalks and stairways are equipped with railings and guards to help eliminate the possibility of danger to employees. It is evident that much thought was given to the design of this, the newest and one of the most efficient of Indiana's stone plants. All three stations are supported on concrete foundations for permanence. Production capacity is about 200 t.p.h.

Albert Berry of Scottsburg, Ind., is president of Radcliff and Berry, Inc. Max Radcliff of Hardinsburg, Ind., is secretary and treasurer, and Earl Gardner of Scottsburg, Ind., a foreman for 17 years with the company was in charge of the construction of the plant. Luther N. Shenk is quarry foreman. This company also is operating a plant at Scottsburg, Ind., which is 10 years old, however, it is planned to rebuild this plant

In the foreground is the primary crushing station. Both the second and third stations have closed-circuit return of oversize to crushers and by belt conveyors back to screens

# New Operating Practices Take Spotlight

**National Crushed Stone Association sessions report expanding volume of business. Discuss new blasting and crushing practices**

OVER 800 were registered at the thirtieth annual convention of the National Crushed Stone Association and the second annual convention of the Agricultural Limestone Division of the National Crushed Stone Association, held January 27-29 and January 30-31, respectively, at the Edgewater Beach Hotel, Chicago, Ill. Attendance was the largest in history for the crushed stone industry.

Two conventions were held consecutively, with a single banquet the evening of January 29 for both organizations, since many crushed limestone producers are, of course, engaged in the production of commercial aggregates and agricultural limestone as well. This report is confined to the National Crushed Stone Association convention; proceedings of the Agricultural Limestone Division are reported elsewhere in this issue.

The N.C.S.A. convention was preceded by a meeting of the Board of Directors and concluded with a meeting of the newly-elected Board according to custom. One entire session was set aside for the annual business meeting, including the election of officers; and the convention as a whole presented a well-rounded program of papers. Particularly successful, we think, was the all-day session for operating men and equipment manufacturers, which was attended by a "full house." Those sessions, started a few years ago for the particular benefit of operating men, are gaining acceptance year by year as evidenced by increased attendance and participation in the discussion from the floor.

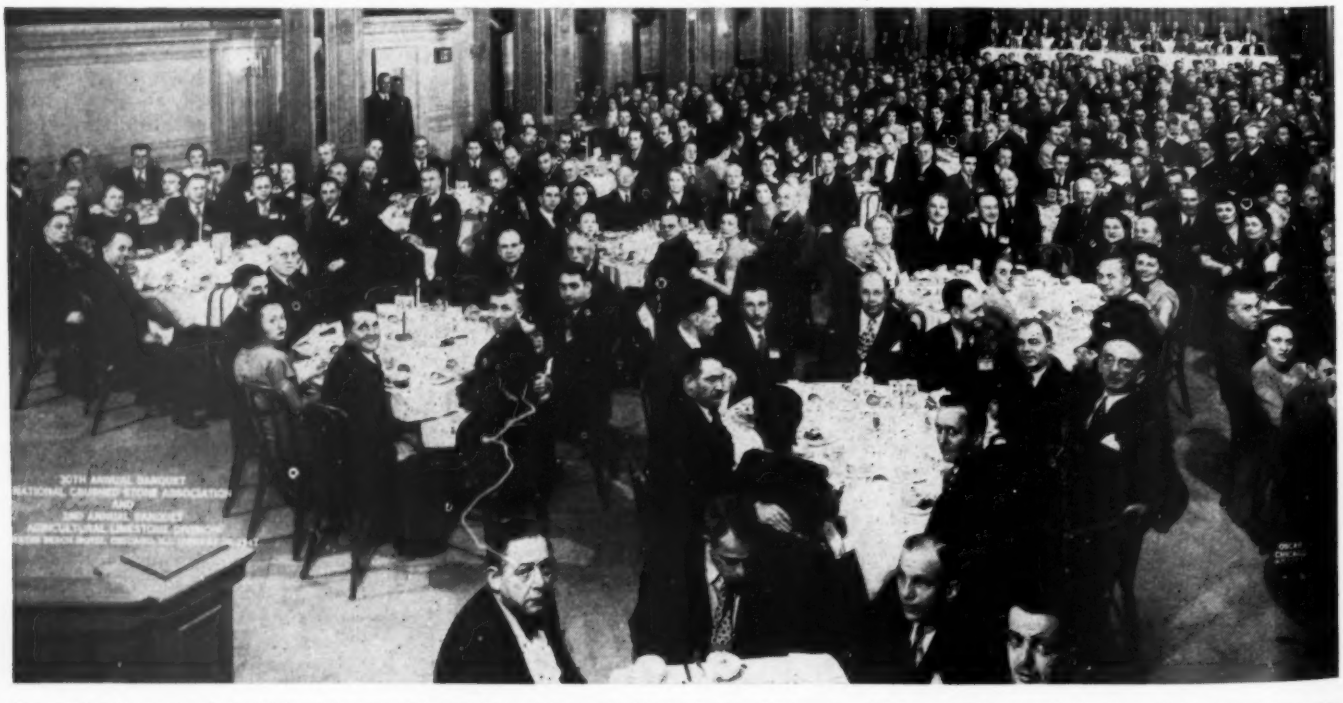
### Presiding Officers

**• PRESIDING OFFICERS for the general convention sessions were President G. A. Austin for the opening session; A. T. Smith, Rock Hill Quarries Co., St. Louis, Mo.; W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.; V. C. Morgan, Kentucky Stone Co., Louisville, Ky.; T. C. Cooke, Lynn Sand and Stone Co., Swampscott, Mass., and Nelson Severinghaus, Consolidated Quarries Corp., Decatur, Ga. (co-chairmen of operating session).**

The Manufacturers' Division of the National Crushed Stone Association held its annual meeting, this time at a luncheon and not at breakfast, to elect officers and transact its business affairs.

### Next Convention

The 31st annual convention of the Association is to be held at the Netherland Plaza hotel, Cincinnati, Ohio, probably in January, 1948, marking the resumption of machinery exhibits, and will be held in conjunction with the National Sand and Gravel Association and the National Ready Mixed Concrete Associaton. A plan is to be worked out with the executive committee of the Manufacturers' Division to determine whether exhibits will be held in 1949, the ultimate plan being to hold expositions in alternate years wth those of the Road Show, which would be in 1949, 1951 and so on. However, unexpected cancellation of the 1947 Road Show may result in holding expositions in connection with



**Convention banquet of the National Crushed Stone Association and the Agricultural Limestone Division. Officers and directors of the two groups are seated at the two long tables to the rear. This is only a partial view of the entire group**

the National Crushed Stone Association convention in 1948 and again in 1949, dependng upon action of the Manufacturers' Division executive committee. There is a great demand by the crushed stone industry for an exposition in 1948, regardless of conflict with the Road Show.

The Association expressed its appreciation to the Manufacturers' Division for its financial aid and its evidence of loyality in subscribing $3000 to compensate for loss of income to the Association through inability to hold an exposition in 1946. The Division has subscribed $3000 again for 1947.

### New Association Quarters

A new scale of dues amountng to a 20 per cent increase based on tonnage produced was adopted, effective in 1947, in order that the Association may render more services to the membership and to cover the cost of new Association headquarters in Washington. The Association has purchased a building that will be remodeled into permanent quarters, housing offices and all the necessary equipment for engineering research and testing. In presenting to the membership the need for a $70,000 budget, Otho M. Graves reviewed the accomplishments of the Association from the beginning when it occupied the back room on the second floor of an old building in Columbus, Ohio, to the present when it will have ownership of permanent headquarters.

### Tribute to E. J. Krause

Fitting tribute was paid to E. J. Krause, president of the Columbia Quarry Co., St. Louis, Mo., who died September 30, 1946, in a resolution by the National Crushed Stone Association, and also by the Agricultural Limestone Division and by the Manufacturers' Division. W. H. Wallace, chairman of the resolutions committee, reviewed the accomplishments of Mr. Krause in behalf of the Association. He was a founder of the Association, its third president (1921), a member of the Board of Directors from the beginning and had served on the executive committee for many years. Credited with being one of the staunch supporters of the movement to establish a testing laboratory and a prime mover in the organization of the Agricultural Limestone Division, greatest tribute was paid Mr. Krause for his gracious personality and his sound executive judgment. It was unanimously moved that the tribute read by Mr. Wallace be spread over the minutes of the convention and that copies be sent to Mr. Krause's family and the Columbia Quarry Co.

Left to right: J. R. Boyd, G. A. Austin, and Russell Rarey

### Officers

G. A. AUSTIN, president, Consolidated Quarries Corp., Decatur, Ga., was reelected president of the Association for a second term. W. N. Carter, National Stone Co., Joliet, Ill., was elected to succeed Paul M. Nauman as vice-president for the Midwestern region. The other regional vice-presidents are F. W. Schmidt, Jr. (Eastern); T. C. Cooke (New England); W. T. Ragland (Southeastern); V. C. Morgan (Central); W. H. Wallace (Northern); A. J. Wilson (Western); and E. Eikel (Southwestern). James Savage, Buffalo, N. Y., was reelected treasurer as were J. R. Boyd, administrative director; A. T. Goldbeck, engineering director; and J. E. Gray, field engineer.

There was one new appointment to the executive committee, W. N. Carter of National Stone Co., Joliet, Ill., succeeding F. O. Earnshaw. The committee in addition to Mr. Carter comprises G. A. Austin, chairman, Decatur, Ga.; Otho M. Graves, Easton, Penn.; Russell Rarey, Columbus, Ohio; F. W. Schmidt, Jr., Morristown, N. J.; Stirling Tomkins, New York, N. Y.; W. F. Wise, Dallas, Texas; and A. L. Worthen, New Haven, Conn.; S. P. Moore, Cedar Rapids, Iowa, representing the Agricultural Limestone Division; and J. B. Terbell, New York, N. Y., representing the Manufacturers' Division. Mr. Moore, was reelected chairman of the Agricultural Limestone Division, and Mr. Terbell was reelected chairman of the Manufacturers' Division. Otho M. Graves was reelected to represent the National Crushed Stone Association on the executive committee and board of the directors of the Agricultural Limestone Division. (A complete list of directors appears in the Personal News section of this issue.)

## Greeting Luncheon

JOHN C. TAUBER, president, The Trap Rock Co., Minneapolis, Minn., presided for the greeting luncheon which featured a most interesting talk on "The Washington Scene" by WALTER CHAMBLIN, JR., vice-president in charge of legislative relations, National Association of Manufacturers.

Mr. Chamblin made some predictions as to what action the new Congress may take in the way of legislation affecting industry. He believes that some form of labor legislation will pass and that the House will override a probable veto. However, he considers the Senate, in which Robert Taft is the power, as doubtful insofar as its action will be on new labor legislation.

In the matter of portal-to-portal pay suits, he anticipates a combination bill consisting of a rewriting of the N.L.R. Law and in combination with the Gwynne bill, establishing a

T. B. Terbell, chairman, Manufacturers' Division, left, with J. R. Boyd, and A. L. Worthen

statute of limitations. Tax reductions will run up against many delays, in his opinion.

Mr. Chamblin emphasized that industry must become interested in federal legislation or someone will who does not understand or care for the effects on industry.

## President's Report

G. A. AUSTIN, president of the National Crushed Stone Association, called the 30th annual convention to order on an optimistic note, this being, as he said, the first convention of the industry since the return of free enterprise in business. He commented very briefly on the adverse effect of controls and the need for special favors which no longer are necessary to the conduct of business. Some wage increases can still be expected without price increases, but, he said, once again profit can be realized as an honorable objective.

Mr. Austin presented the annual report on business conditions and the outlook for 1947 as summarized from reports received by the regional vice-presidents.

The volume of business for the industry was approximately the same in 1946 as in 1945. An average increase in volume of 30 per cent, with a range of 15 to 50 per cent reported from various localities, is anticipated in 1947. Based on conservative estimates, all except one company reporting anticipated increased volume in 1947, although most predictions had qualifications.

As to prices, they remained approximately at the same level in 1946 as in 1945. One company reported an increase of 10 per cent and another one 20 per cent near the end of the year, while a third company actually reported a price reduction.

The ratio of volume produced to capacity in 1946 averaged between 60 per cent and 70 per cent, or a utilization of two-thirds of the industry's ability to produce with existing facilities.

W. S. McHenry, New York Trap Rock Corporation

In some cases, volume of production equalled plant capacity while, in one case, production was only 20 per cent of capacity. A shortage of small sizes was reported in some areas, due in part to the many new concrete plants which reflected a large demand for small sizes of aggregates. Mr. Austin pointed out that this condition has resulted in an incorrect impression as to the industry's ability to produce crushed stone.

On the average, 45 per cent of production was for highway production, with a reported range of 35 per cent to 70 per cent. Ballast represented from 15 per cent to 25 per cent of the total volume. The average was 20 per cent. In one case, 50 per cent of the tonnage sold was ballast. Building construction requirements were for 20 per cent of the volume, the range reported being from 5 per cent to 30 per cent. The remaining 15 per cent of the tonnage was for the construction of airports and various other large tonnage jobs.

The volume of crushed stone to be moved in the construction and maintenance of highways is expected to increase in 1947. The railroad ballast volume is expected to remain at a high level.

In his summary, Mr. Austin emphasized that the prospects for favorable labor relations tempered the predictions for 1947. The industry is concerned with wage demands yet to be made, productivity of labor, the prospects for legislation to equalize the rights of management and labor and the availability of supplies and equipment.

### Report of Engineering Director

A. T. GOLDBECK, engineering director of the N.C.S.A., in his annual report, outlined recent important laboratory research under his direction and briefly summarized his other engineering activities. Despite the fact that Mr. Goldbeck spent more time in the field in 1946 than in previous years, he reported a number of interesting research projects underway in the laboratory.

One of the studies is a coöperative series of tests between the Connecticut State Highway Department, the National Sand and Gravel Association, the Public Roads Administration and the N.C.S.A., having to do with the relative merits of trap rock and gravel in pavement concrete. Trap rock has been permissible to the exclusion of gravel in the specifications until recently. Air entrainment has been considered in the series of tests,

Raymond A. Matthews, new president of Kentucky Stone Co., and a newcomer to the convention

results of which have not yet been revealed.

Mr. Goldbeck also described tests on stabilized gravel and stone road mixes conducted in the interests of stone producers in Illinois who are in competition with lower cost of gravel produced at the jobsite. An elaborate series of tests using gravel and stone from Illinois was conducted which indicated, according to Mr. Goldbeck, that the gravel would have to be one-fourth to one-third thicker than the stone for equal load-carrying capacity.

Other investigations discussed briefly have to do with the relative durability of dense and open mixes using both hard and soft asphalt, the effect of time of drying on specific gravity of coarse aggregate, hot mix-cold lay bituminous pavement, the suitability of trap rock "air float" dust as a filler in asphaltic concrete, the stabilization of soil subgrades by the use of limestone dust and other admixtures and comparisons of certain crushed stones and gravels in durability tests of concrete.

In investigations of soil subgrades, work is now under way to determine if limestone dust can be used in economical quantities to alter soil characteristics in sufficient degree to improve their quality, as portland cement and hydrated lime are now used. In the case of a limestone sand rejected for concrete pavement use, tests are being conducted to determine if the rejected stone might not be found suitable in air-entraining mixtures. Various routine tests involving many aggregates were briefly described.

Mr. Goldbeck concluded with a summary of technical papers prepared for publication, talks given before various organizations and his activities on various technical committees. He recently was elected chairman of the Subcommittee on Railroad Ballast of

the Committee on Roadway and Ballast of the American Railway Engineering Association.

J. E. GRAY, field engineer of the N.C.S.A., summarized his activities during 1946, involving essentially technical assistance to producers on engineering problems and making known the results of research.

Among field investigations mentioned were one of the service behavior of traffic-bound roads in a midwestern State, tests on the relative concrete-making properties of gravel and crushed stone, inspection of surface treatments on old concrete pavement, interpretation of State specifications and in connection with stone rejection. A number of talks to make known the results of research were given by Mr. Gray before engineering organizations in 1946.

He urged the membership to avail themselves of his services in connection with technical problems. During 1946, he personally had called on nearly all members in eleven States.

### Secretary's Report

J. R. BOYD'S annual report to the Board of Directors as administrative director of the N.C.S.A. was confined largely to budgetary matters and the acquisition of a building in Washington by the Association for the establishment of permanent headquarters. A suitable building had been located and purchased after a long search and transfer of the property was to take place following this convention.

The new association headquarters, increased operating costs in normal operations and the absorption into the general budget of the cost of financing the office of field engineer were the basic factors, as pointed out in Mr. Boyd's report, that led to the 20 per cent increase in the rate of dues, effective for the year 1947. The 1947 budget will be $70,000 as compared to $53,715 in 1946.

Membership is practically the same as it was a year ago, there being four new member companies but also several consolidations to offset that increase. Associate members total 69 as compared to 68 a year ago.

Mr. Boyd commented briefly on the affairs of the Agricultural Limestone Division which now has 186 active members and 24 associate members. This represents an increase of 46 active members during the past year.

In his report to the membership in the opening session, Mr. Boyd detailed the Association's strenuous efforts in behalf of the membership during 1946 to secure price decontrol and in the freight rate increase case by the railroads which resulted in a 15 cent per ton increase as compared to the 20 per cent increase petitioned.

Nelson Severinghaus and George Lott, Jr., carry on the operating meeting discussion after hours

# CONSTRUCTION OUTLOOK

RESEARCH DATA compiled by the Federal Works Agency indicate that 1947 will be a very satisfactory one from the standpoint of the construction industry, totalling $13,300,000,000 or an increase of 30 per cent over the 1946 level, according to JAMES W. FOLLIN, assistant administrator of the Federal Works Agency in a paper presented before the National Crushed Stone Association convention. This estimate was in terms of 1946 prices and is based on the assumption that there will be no widespread strikes and no general business depression.

While there may be some increases in wages and some increases in building material prices, an anticipated smoother flow of materials and labor productivity might actually reflect in no increase or even an actual decline in costs per unit of construction, in his opinion.

As to housing, there may be more than a million units started in 1947 and nearly as many completions, to represent about 5.8 billion dollars. This is at a rate 50 per cent above 1946.

Mr. Follin said that, contrary to general misunderstanding, not all of the 7.5 billion dollars of predicted non-residential construction is controlled by Order VHP-1. Many types of engineering construction such as highways, dams, reclamation, river and harbor work, communications and railroads, sewage and water supply projects are exempt from the control order except for buildings and structures accessory to such projects.

Military projects and veterans' hospital construction, and exempted work in the public works and public utility fields is estimated for 1947 at $3,300,000,000. Farm construction for 1947 is estimated at $500,000,000 and non-residential building construction at $3,700,000,000, or at about the same rate as in 1946.

He mentioned that it may be possible to increase non-residential building construction if the material supply improves or if housing does not develop to the extent indicated. The amount of non-residential building construction permitted under VHP-1 during the last half of 1946 was held to a dollar volume of 35 million a week for the country as a whole. Recently, he said, the weekly permissible volume was increased to 50 million dollars a week.

As to public construction, he characterized the outlook for public construction as anything but bright in view of the accumulated needs. A little over three billion dollars worth of engineering and building construction is anticipated in 1947, in terms of 1946 prices. That figure represents about $750,000,000 more than we had in 1947 but, he said, is not enough to begin to compensate for the public construction postponed during the war and still further deferred.

The total highway investment in 1947 is expected to be about $1,300,000,000 of which $925,000,000 will be in the form of State and local contributions and $375,000,000 in federal-aid funds. The federal contribution will be less than expected in view of the fact that the Federal-aid Highway Act of 1944 authorized a federal contribution of $500,000,000 a year for each of the first three postwar years. High costs are continuing to slow highway building, he said, rather than any desire to accumulate a backlog of work for later alleviation of depressed conditions. Delayed repairs to the nation's highways are badly needed, he said, and a large part of the entire national network must be rebuilt and brought up to modern standards. Many of the roads built in 1920 are absolutely obsolete.

About 50 million dollars will be 1947's total investment in airport projects, financed half by federal money, as compared to 12 million dollars in 1946. Approximately 300 million dollars will be spent in public works such as flood control, irrigation, reclamation and river and harbor improvements. The Veterans' hospital building program, now gaining momentum, will run about $175,000,000.

For the more distant future, Mr. Follin was decidedly optimistic, due to the tremendous amount of public works needs. Even at 1939 levels, the investment in public works discontinued during the last five years would have contributed 14 billion dollars in terms of new schools, hospitals, water works and sewer systems, and other facilities needed to provide the necessities of life and to meet the requirements of an increasing population. Mr. Follin concluded with a discussion of construction's part in the overall economy of the country, pointing out that all public works construction cannot be postponed until there is a decline in private construction.

# Getting Worker Cooperation

EMPLOYERS are in a better position than they have been in for many years to get the cooperation of workers, according to WHITING WILLIAMS, Consultant and Adviser on Industrial Relations, who addressed the National Crushed Stone Association on the subject, "Getting Worker Cooperation Today." Mr. Williams appeared before the Association several years ago and, again, left the industry with constructive suggestions for the improvement of employer-employe relations.

The most important reason given for the existence of more favorable opportunity to secure worker cooperation is that the alliance between the White House and the C.I.O. was ended November 5, 1946, representing a protest on the part of the American public which resulted from its experience with strikes and jurisdictional disputes, shortages, riots and threats and the like.

Mr. Williams, who bases his observations and predictions on actual experience with the public and with the employer and employe out in the plant or mine, thinks that the public is hoping that the biggest job in connection with the overall improvement of conditions in the country will come from the employer. And, he believes that the public does not think that worker cooperation and increased productivity can be obtained simply by the passing of laws.

The employer must learn to appreciate that there is a significant improvement in the industrial climate today as compared to conditions as recently as six months ago, he said, so that he can take advantage of the opportunity afforded. The first step toward getting worker cooperation, in his opinion, is for the employer to go ahead with the fulfillment of existing union contracts but insist that the effort to maintain that contract shall be accompanied by renewed effort to rediscover the individual employe. He then went into a discussion of factors mentioned in his earlier talk before the Association — matters such as worker fear, pride, self-respect, hope, commendation, communication and contact, which constitute essentials for consideration in any healthy worker-employer relation. He particularly emphasized that the worker must be in a position to have self-respect and accompanying pride in his work, hope for personal advancement and that more information should be made available to the worker in order to achieve those goals. Workers want to be taken into the confidence of employers and to be consulted where they have some experience of value to making operational decisions.

In Mr. Williams' opinion, management cannot possibly approach the problem of getting cooperation of its workers except as it first devotes itself to handling these matters of pride, fear, hope, explanation, contact and commendation with its foremen. One of the biggest obstacles in the entire field of industrial relations, he said, is that workers continue to be convinced that every employer makes huge profits.

Significant, we think, was Mr. Williams' statement that it is worthwhile for management today to pay less attention to trying to win victories in court and give more attention to winning friends out in the plant. Unions, while performing a valuable service in helping to give the ordinary worker a maximum of job protection have given a very disappointing service to the worker with respect to his hope for promotion.

One of the troubles is that the employer has tended to lose confidence in himself and in his employes, because of past events that have convinced the public that the businessman and the industrialist are dishonest and not to be trusted.

## Concrete for Housing

AN INFORMATIVE TALK depicting the importance of the housing and building construction market, and illustrated by a sound, colored movie, "Better Farm Homes of Concrete" was presented by W. G. KAISER, chief of the Farm Bureau, Portland Cement Association.

Mr. Kaiser predicted that 54 per cent of all construction will be housing in 1947. Seven billion dollars of a total of 13 billion dollars to be spent for construction will be for new housing, according to his figures. Nonresidential building will total 3½ billion dollars and 2½ billion dollars will be spent for public building. In addition there will be a six billion dollar expenditure for maintenance and repair. Construction on the farms will be about one and one-half billion dollars and, he emphasized, involves more materials than appears on the surface because the farmer actually does most if not all the work.

According to Mr. Kaiser, 500,000 of the 1,000,000 homes predicted for completion in 1946 were built but the figure includes all kinds of makeshift dwellings in the total. There should be about 1,000,000 units completed, including those started before, in 1947.

The film, while made for use in promotion of the farm construction market, was applicable for the demonstration of the construction and use of concrete in any kind of home. It showed construction, structural details and the use of a variety of precast concrete units including steps and risers, concrete masonry walls and various types of joists and floor systems. The film is used by the Portland Cement Association for presentation before group meetings of builders, contractors and architects and in the colleges and other schools.

## Stone Vs. Gravel

A. T. GOLDBECK, engineering director of the National Crushed Stone Association, in a very informative paper "Studies of Stone vs. Gravel in Traffic-Bound Roads," summarized the results of investigations to determine the relative stabilities of surfaces as determined by the aggregates used in their construction.

In recognition of the fact that crushed stone is at a competitive disadvantage with much cheaper and more readily available pit or bank gravel for use in traffic-bound roads, the investigation was conducted to determine how to meet this competition. The studies described and summarized were for the purpose of determining if a stone traffic-bound road could be made thinner, by virtue of greater stability, than a bank gravel road, both having the same wheel-load carrying capacity.

Much of the paper was concerned with the fundamentals of load distribution to the underlying subgrade due largely because of internal frictional resistance and the mechanical interlocking of the aggregate particles; detailed description of test procedure with different crushed stones and gravels; and technical discussion and interpretation of results.

Results of four different kinds of tests were presented, as follows:

1. A test to determine the relative ability of the stone and gravel sections to spread the wheel-load (circular track tests on surfaces of the two aggregates) over the subgrade as shown by subgrade pressure measurements.

2. A traffic test to determine the relative resistance to actual rubber-tired traffic loads.

3. A laboratory test for the relative punching shear resistance which is a measure of stability.

4. A load bearing test on crushed stone vs. gravel railroad ballast.

The results, according to Mr. Goldbeck, were consistent in showing that a traffic-bound road surface made with angular crushed stone is superior to that made with gravel. It was found, according to his tests, that the stone road is more stable and that a lesser thickness of it is required to support the wheel loads of traffic. It was further found to be more uniform in its resistance to indentation and displacement under traffic and less adversely affected under wet conditions, according to Mr. Goldbeck. The conclusion was reached that at least one-third more gravel (thickness) would be required than of stone for equal load support and that even more gravel than of stone would be required on untreated surfaces.

# Dust Control In Industry

V. C. MORGAN, vice-president, The Kentucky Stone Co., Louisville, Ky., presided at the Tuesday afternoon session, January 28.

THEODORE F. HATCH, research director, Industrial Hygiene Foundation of America, Pittsburgh, Penn., in his talk on the subject, "Dust Control in Industry," gave some very practical suggestions. He pointed out that dust control may be installed for many reasons; including cleaner working conditions for employes, elimination of potential silicosis hazards, wear on bearings and other moving equipment, etc.

Mr. Hatch outlined the fundamental principles of dust control, and said that the first step should be to determine the objective. In the case of conditions which may induce silicosis, he said that the presence of free silica in uncombined form and the particle size are the important considerations. Dust concentration is a third factor. As the particle size goes down, the concentration must be less to reduce the hazard. Length of exposure is important, particularly as the age of workers has generally increased throughout industry. It takes a period of time to produce disabling silicosis, the average for all industry being 10 years. Very little dust by weight is required to cause injury.

Turning to the question of methods of dust control, Mr. Hatch explained the terms "dust generation" and "dust dispersion." Crushing of rock and abrasion in grinding are examples of dust generation, but the biggest problem is dust dispersion. Using foundry sand as an example of dust dispersion, Mr. Hatch said that a sample of foundry sand would be high in free silica, but the dust arising from the handling of the dried sample may have a relatively low percentage of free silica. He told about experiments he had made with particles of various size to determine the trajectory of the particles. The purpose was to find what counteracting force would be required to prevent dispersion. It was soon learned that the problem with fine particles was to collect the moving air containing the particles, and the phenomenon of air displacement must be studied. He cited the hammermill as having very much the same action as a fan in dispersing dust. Heat also moves air, and a stream of falling rock creates a very appreciable air movement, such as rock falling from one conveyor belt to another or to a stockpile. Falling rock has 90 per cent voids and when it comes to rest, air is squeezed out or blows away. An elevator, particularly immediately following a dryer, acts like a chimney in creating dust flow. A flywheel also is a cause of air movement and dust dispersion.

Mr. Hatch suggested that the source of air flow from all equipment should be measured, and then the air displacement necessary to exhaust the air determined to prevent dust dispersion. One test showed 5000 cu. ft. per minute of air displacement was required in one stone plant to correct dusty conditions. The number of cubic feet of air displacement is in direct relation to the tonnage, he said. Height of chute or fall also is an important factor.

Certain things can be done, he said, to prevent dust dispersion. Air can be throttled in elevators and chutes by making smaller openings. In surge bins the height of fall of the stone can be cut down to a minimum. Pressure relief in elevators can alleviate dusty conditions. Points of dust generation also can be enclosed. In closing, Mr. Hatch told about studies now being conducted by the Foundation.

In the discussion which followed, it was brought out that it is possible that the same dust, causing a hazard, under different conditions may not be dangerous. X-ray diffraction will determine free silica accurately. From 10 to 15 per cent free silica is dangerous. In reply to a question, Mr. Hatch said that enclosed conveyors constitute a more hazardous condition from the standpoint of silicosis.

## Asphaltic Concrete

GEO. H. DENT, district engineer, Washington, D. C., The Asphalt Institute, followed Mr. Hatch on the program with his paper, "Some Basic Principles Concerning Asphaltic Concrete" which was prepared in conjunction with Bernard E. Gray, chief engineer of the Institute, New York, N. Y. After briefly outlining the early uses of petroleum cement products for pavement, starting with rock asphalt and finally the increasing growth in petroleum derivative products, Mr. Dent told how The Asphalt Institute had worked to reduce the number of cut-back asphalts from 100 to 12 and had helped to simplify and standardize specifications for asphaltic pavement mixtures. Referring to the remarkable growth in the use of these materials, he said that in 1930 only 160,000 tons were laid as compared with over 2,000,000 tons in 1946. (More complete details of this interesting paper are published on page 106.

### Discussion

In the discussion which followed, Mr. Dent said, in reply to a question, that both continuous mix and batch plants produce equally good road material. Gradation of the quarry product, he said, is only one of the factors making up an acceptable material. On the question of skid resistance, the best pavement, he said, was a limestone surface treatment recommended by Prof. Morely of Iowa. Mr. Munson of New Haven Trap Rock Co. wanted to know whether the Institute would be interested in studies of types of stone from the standpoint of their asphalt adhering qualities. Mr. Dent said the Institute would be interested. Mr. Dent said that the trend was to softer asphalts with wartime built airports. This trend also has become more apparent with highway departments with 85 to 100 penetration asphalt cements being used. Answering another question, he said that not over 5 per cent and not less than 2 per cent voids for sheet asphalt is recommended. On the question of segregation in hauling asphaltic concrete, hauls up to 50 miles in modern truck equipment have been made without any evidence of segregation. Mr. Brandon of Ohio said that Ohio practice is now calling for 85 to 100 penetration asphaltic concrete for heavy traffic. Mr. Dent said that the use of limestone fines for cold mixes had proved successful.

## Stone for Shore Protection

MARKETS for stone to be used for shore protection offer a large potential market in the future according to Spencer Smith, president, American Shore and Beach Preservation Association, New York, N. Y., in a talk entitled "Expanding Opportunities for Use of Stone in Shore Line Protection."

With passage of H.R. 2033 in the last Congress, Mr. Smith pointed out that the federal government has adopted the policy of contributing up to one-third of the cost of structures for shore line protection upon approval of the Corps of Engineers. With this type of legislation already at hand, he urged that the crushed stone industry recognize the market that can be developed through its help in putting the need for more shore protection over to the public.

Approximately 200,000 tons of stone were used for the purpose in 1945 and 400,000 tons in 1946 and, Mr. Smith predicted, a million tons will be placed in the next two years. Yet, he said, the need is not nearly being met. On a typical groin which he described, 5 lb. to 150 lb. stone constitute the core and pieces weighing from two to seven tons are placed for outside protection.

Millions of dollars have been wasted for structures designed to attempt to build up protective sand in the past, as people built up the coastal areas, he said, where the real need is for powerful structures of the kind that can be built from stone. He urged cooperation between suppliers and contractors in order to capitalize, for the good of the public, on the services and funds already available by law.

# Operating Sessions Draw Crowds

INTENSE INTEREST is being generated in the operation sessions of the annual National Crushed Stone Association. This year the entire third day was set aside for operating men and equipment manufacturers to interchange their ideas in informal discussion from the floor, using portable loud speakers and monitors so that anyone in the convention room could participate. The meeting was an excellent one that attracted and held the largest crowd of any sessions of the convention.

T. C. COOKE, president, Lynn Sand and Stone Co., Swampscott, Mass., and NELSON SEVERINGHAUS, general manager, Consolidated Quarries Corp., Decatur, Ga., were co-chairmen as they have been the past several years and, as usual, did an excellent job in leading the discussion.

The first question was whether it was worthwhile to publish the transcript of the operating men's session and the answer was a unanimous yes.

The second question was concerned with the reduction or prevention of injuries to jackhammer operators and the discussion immediately shifted to the use of the drop ball as a substitute in eliminating the most hazardous job in the plants.

It has been discovered to the sorrow of certain producers that the success of the drop ball operation depends upon having a skilled crane operator. Ted Cooke predicted that many drop balls will go into service this year. For the protection of the crane operator he uses an 18- x 36-in. piece of Plexiglas, 1 in. thick, set in rubber and at an angle so that flying pieces of stone will strike glancing blows. The Plexiglas will not shatter and, according to his experience, affords perfect vision. The use of wire screening proved unsatisfactory, because it was hard on the operator's eyes and did not afford proper visibility.

When asked if the drop ball was effective for breaking all kinds of stone, Mr. Cooke said that the drop ball can break any stone on earth and that it would be a good investment if five men can be displaced by a crane operator.

He has a 1½ cu. yd. crane which he considers ideal, with a 60-ft. boom and a 6000 lb. ball with a vertical axis double the horizontal axis. Before standardizing on the 6000 lb. ball, a 7800 lb. ball was tried. It was found too heavy for the stone which, incidentally, is a very tough diorite. The steel sloughed off the ball as its durability was exceeded. Less than 5000 lb. proved too light. When the ball wears off to 5000 lb. weight a removable section is replaced, it being the means of keeping the ball close to the ideal weight. As to shape of the ball, Mr. Cooke said that was not a factor. Abe Goldberg of Allis-Chalmers Manufacturing Co., mentioned the two piece drop hammer with removal shoe developed by Allis-Chalmers as the result of the discussion in previous meetings.

W. S. WESTON, JR., Weston and Brooker Co., Columbia, S. C., in a discussion of operating details of the drop ball, mentioned that Massachusetts Broken Stone Co. uses a small ball above the breaking ball to keep the wire rope taut. In Mr. Cooke's operation, the ball is braked at the instant of impact. A 1⅜-in. double-strand cable can be replaced in 15 minutes. Edward Jones, Material Service Corp., Chicago, described a connecting mechanism in use consisting of eight lengths of chain. There was some discussion of the principle of the free-swinging ball, one operator mentioning the use of the fair lead to turn over stone from behind.

The subject of safety itself in the quarry shifted to a consideration of steel-toed shoes and the recommended wearing of protective hats near rock ledges. Experience has been that workers hate to wear protective hats because of the weight.

## Drilling-Blasting

The subject of drilling and blasting was thoroughly considered and the experience chart (shown on page 85) was of great interest in starting off the discussion. W. H. RUBY, Acme Limestone Co., Fort Spring, W. Va., said that in his experience it is cheaper to use more powder in primary blasting. Cutting the yield from four tons to three per lb. of powder, by this practice, is more than offset by the saving in secondary drilling and blasting, he said.

BRUCE S. CAMPBELL, Harry T. Campbell Sons' Corp., Towson, Md., mentioned the use of a new drill by Joy Manufacturing Co. that is claimed to yield 60 to 70 ft. of hole per day but no one present was familiar with it.

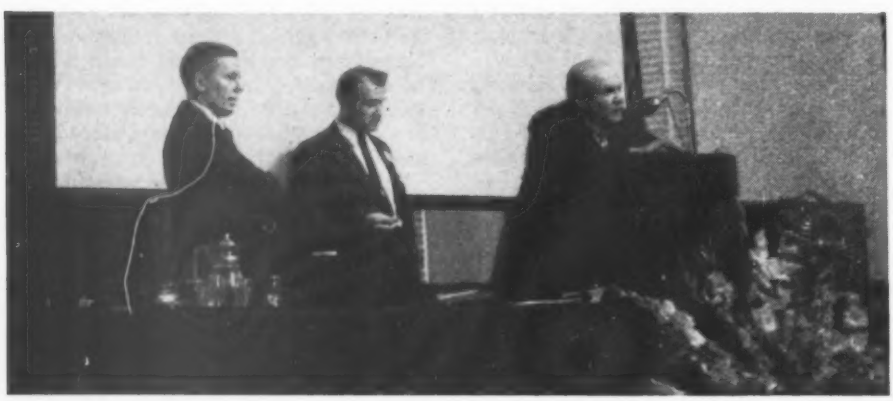
TED COOKE said that there was a crying need for reduction in drilling costs, which according to the chart (reproduced herewith) he believes are too high generally. Some interest was expressed in the possibilities of diamond drilling but those with abrasive stone anticipated the cost would be too high.

When asked to comment on the relative advantages of larger blast holes against denser powder, R. C. Crumbaugh of du Pont said that crusher size, height of face and the type of deposit are the variables that require consideration in the control of fragmentation. Nelson Severinghaus told of the application of fusion piercing with oxygen as fuel, used in drilling taconite (low-grade iron ore) at the rate of 10 ft. per hr. for 6-in. holes whereas 1-ft. per hr. was standard performance before.

In a discussion of the elimination of quarry toes, MILO NICE, Hercules Powder Co., said that there was no new information other than was discussed a year ago. Proper drilling, spacing, depth and correct placing of the bottom powder are the real answer he said, barring the variables that cause difficulty. Increased hole spacing with decreased burden has been found helpful, he said. John Jeffries, Atlas Powder Co., said that detonation from the bottom of the hole is helpful in the elimination of toes. He described the use of electric detonators in combination with Primacord to set off deck charges.

(Continued on page 112)

Ted Cooke, left, and Nelson Severinghaus, running Operating Session



Left to right, Nelson Severinghaus, Dr. Leet, and L. F. Miller

# Delayed Action Blasting

By L. F. MILLER*

**Paper presented before Operating Session**

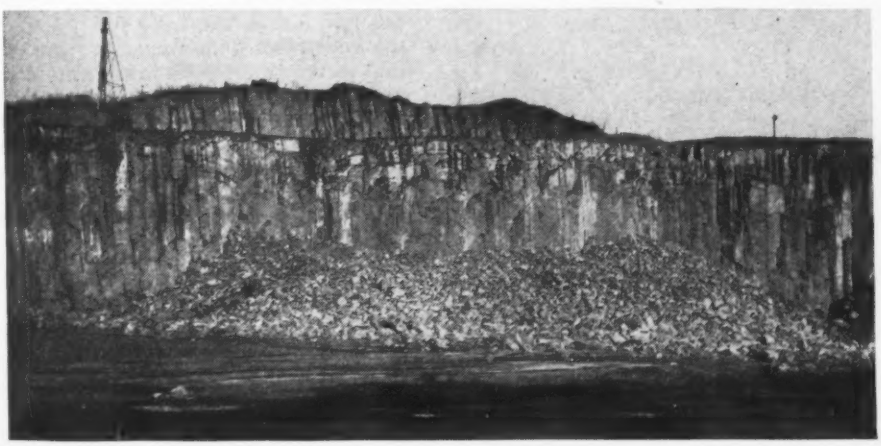
A FEW YEARS after the use of dynamite was well established, an electric blasting cap was introduced. This cap differed from the original fuse and cap because it could be detonated from a distance, simply by throwing an electric switch. Also a large number of these caps could be fired simultaneously and great quantities of stone could be blasted down at one time. Well drills were brought in the quarries and in the holes drilled with these machines, greater amounts of dynamite could be placed and shot. There was practically no limitation put on the number of holes that could be fired at one time or the amount of stone blasted in a single shot. Great improvements were made in the quality of dynamite and much larger blasts were fired by means of the electric blasting cap.

While it is a well known fact that blasting operations, conducted according to accepted standards, can not cause injury to or damage houses and other structures, there are some people who think they do. Our efforts have always been to use methods of shooting which may reduce vibrations to a point where no one is disturbed.

According to reports furnished by the Bureau of Mines, we are told that they have found, "the amount of vibrations or earth movement is in proportion to the amount of explosives fired at one time." In looking through our records we found four tests which had been made at the same location when the amounts of explosives ranged from something less than 600 lb. to a little more than 2500 lb. By studying the results of these tests we found that the report furnished by the Bureau checked very closely with the results our tests had shown. (A slide made of these tests showed how the amount of vibration varies with the amount of explosives fired at one time.)

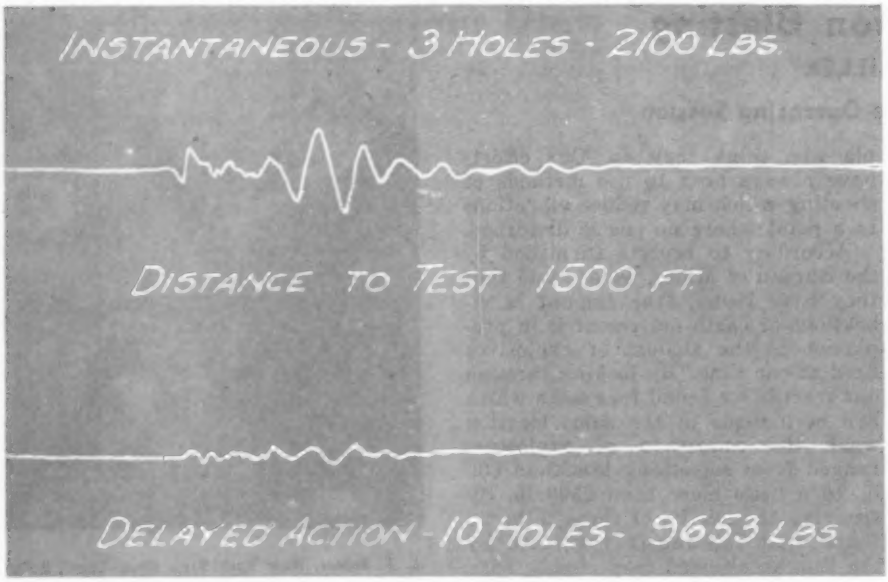
Based on these tests and others, we believed that if a different method of detonating the holes could be worked out and instead of firing all of them at one time they could be separated and fired singly or in groups, a reduction in the amount of vibration should result. We also believed that by firing a shot in this manner, better fragmentation might be expected, believing the stone should "peel off" with a rolling action. There is one point I want to make absolutely clear at this time. We do not make any claims whatever that we have been the originators of delayed action blasting methods. A number of years ago this method of blasting was tried but not adopted for general use. A few years ago one of the powder companies developed a method which is producing good results. Others have played a prominent part in the development of delayed action blasting and we certainly do not want to take the slightest amount of credit away from any company or person who has had a part in this progressive work and full credit is given them for the good job done and results achieved.

L. F. Miller, New York Trap Rock Corp., holds his demonstration lighting device to show how blasting machine works

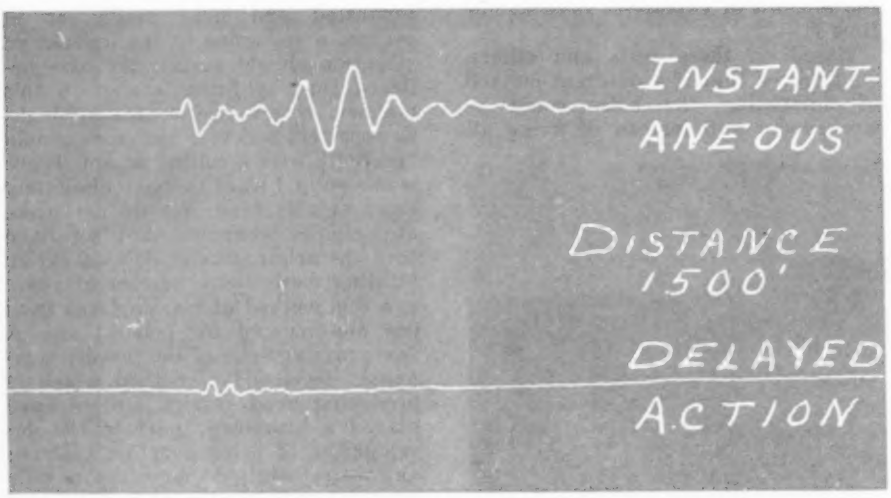


Above: A well-executed 10-hole delayed-action shot in a dolomite quarry. Below: By contrast, the results of an instantaneous, 10-hole shot in a dolomite quarry. Note large number of big rock as compared to the delayed action shot

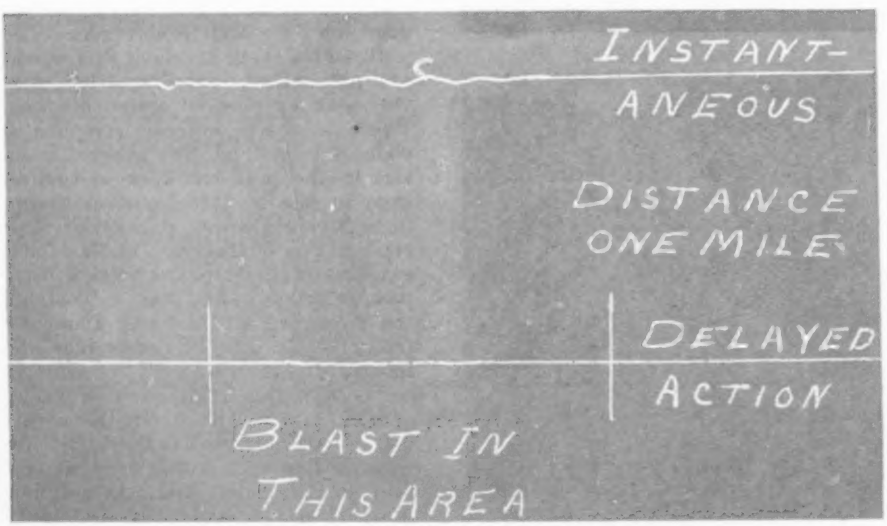
Probably there are some of you who are not entirely familiar with what we mean by delayed action blasting. There is really nothing complicated about this method. The general practice in the past has been to connect caps in one of three general groupings. Straight series, parallel or some combination of these two methods. Regardless of the type connection used, when electric power was applied, all the caps fire at the same time and instantly. In delayed action blasting, instead of connecting all the caps in series or parallel, each hole or group of holes is a shot in itself. When fast delayed action caps are used they are connected in such a manner that certain holes fire first and others follow in their proper order. If a delayed action switch is used, a lead wire from each hole is brought to the switch and connected so the different holes will fire separately or in groups but not all at once, with a slight delay be-




A comparison of instantaneous and delayed action shots. Above, instantaneous, three holes, 2100 lb.; below, delayed action, 10 holes, 9653 lbs.




Result of recorded test made of the first blast fired with the "delayed action switch." This blast compared in size with a previous blast fired instantly, test of which is shown on upper line




When blasts are fired by the delayed action method, practically all traces of vibrations vanish after traveling a short distance. In the illustration may be seen the results obtained with two shots almost identical in every detail and located side by side in the quarry. The top line shows test made of the shot fired instantaneously and the lower line by delayed action. Both tests were made at the same location about one mile from where the blasts were fired

tween the firing of each hole. While this delay is very slight, only a fraction of a second, it is there just the same. Other methods of delayed action firing are used but this general principle applies to all alike; that is, a slight delay between the firing of each hole or group of holes.

What I will attempt to show you at this time is the method of delayed action blasting we are using and the switch we have developed and built and give you a demonstration, showing how delayed action is accomplished. To the best of my knowledge, this application and method of firing with this type switch had never been used before, and since our results have been so successful, I am sure it will be of interest to you to know something about the background.

For several years I have been of the opinion that if each hole in a primary blast could be fired as a separate unit, the amount of vibration set up should not exceed that of the hole containing the greatest amount of explosives. At different times I talked with Dr. Leet regarding this subject and he was in full accord with my belief. Two years ago I drove some nails in a board in a circular manner and by connecting a cap lead to each nail and sweeping a power line across the nail heads the caps fired, sounding very much like a machine gun firing. After this test I was firmly convinced that if we had an electric switch similar to this arrangement we could connect the holes to the switch and fire in any combination desired.

Over a year ago we began studies with the supplier of our explosives regarding a method of delayed action shooting to use in connection with our primary blasting. The first shot fired in this manner was by means of a three position switch furnished by the supplier's engineers. The results obtained were very encouraging and caused us to believe that we were on the right track, but were limited by the small number of delays with a switch of this kind. Believing much better results were possible by a more efficient method of delayed action blasting, we immediately started work on the development of a switch that would have a number of connecting points, each with a definite time delay between points. After much study we decided that a delay of twenty thousandths of a second should give *us* the desired results. It was along that line our developments started and after a month's work our first switch was ready for testing.

This switch was designed to shoot any number of holes from one to ten and while it proved to be very successful in its operation, there were some changes necessary. The motor driving the blade was one that I had removed from an ordinary record player which had a constant speed of

78 r.p.m. But we found a motor of this kind was very susceptible to voltage changes. Our primary blasts are fired from the lines feeding well drills and often when we were near the end of these lines the voltage drop was sufficient to cause the record player motor to slow down slightly and it was not entirely dependable where this condition existed. After using this smaller switch for about two months, we built a larger one with a more powerful motor which was not affected by voltage changes. This switch was provided with points for twenty connections to permit the firing of that number of holes if needed.

We, like many others had been limiting our shots to a small number of holes and for the first shot we tried four holes. Our primary consideration in studying this development was an attempt to reduce the amount of vibrations established without reducing the size of shots by firing a lesser number of holes. Naturally we were very much interested in seeing the results of the vibration test of this first shot fired with the new switch.

The result was most gratifying as can be seen by the (see page 84) record. To make our test, we went to a location 1500 ft. from the face at which place we had made a number of tests of previous instantaneous shots. It was an easy matter to find one of these previous tests of a shot which almost duplicated the shot we fired with the new switch, so far as the amount of explosives was concerned. The two records are reproduced on one picture with both tests shown, one above the other. On the upper line is shown the test as recorded when a previous shot was fired instantly. On this line a moderate amplitude is reached almost immediately after the first movement. This line gradually diminishes and levels off after a short duration. On the lower line is shown the result obtained from our first delayed action blast fired with the new switch, when each

**Dr. L. Don Leet, Harvard University, left, and L. F. Miller, New York Trap Rock Corporation**

hole was fired separately. It can be seen that no sharp peak is reached but instead there is a gradual movement or quivering motion, reaching a very small amplitude which continues a short while and diminishes to nothing. We were exceedingly well pleased with the result of this test and as other shots followed, fired in this manner, all tests showed similar results. No sharp peaks were reached and never more than a very small amount of vibration.

This reduced amount of vibration seems to be attributed to an entirely different action of the stone as the blast is firing. Instead of the entire mass being actually torn loose at one time as it is when the shot is fired instantly, and all kicking out at once, the stone seems to "peel off" as each hole fires. When the explosives in the first hole are detonated and that portion of the stone starts to move outward, the appearance is somewhat similar to a big door opening but instead of moving in a straight line, the stone is under such great tension, it is actually curved toward the second hole. While under this tension and with a part of the stone actually separated from the solid face, the second hole fires and in doing so, instead of exerting the full amount of its energy in tearing the entire burden away from the face, a large part of this energy is directed toward the stone under tension and actually set in motion when the first hole fired.

The result is, that instead of a great amount of energy dissipating itself toward the solid face back of the hole, it is being directed toward the stone which is already separated from the face and in motion. The result is that the force is actually hitting stone suspended in space and the effect on the solid bank causes very little more ground movement than would be noted if this mass of stone was suspended from a heavy sling and then struck a powerful blow with some heavy object. The action is the same for each succeeding hole as it fires and, with the exception of the first hole firing, at no time is there anything like the full force of the explosives being directed at the solid bank. There also seems to be a certain amount of dampening effect on the vibrations as they start their outward movement, as can be noticed when small stones are dropped in a basin of still water in rapid succession. If only one stone is dropped, a little wave is started which continues in about the same proportion until the rim is reached, but if several small stones are dropped in rapid succession, only a very small ripple can be seen over the entire surface after all the stones are dropped and at no time can a continuous wave be noticed. Apparently the ground waves act in a somewhat similar manner when a delayed action blast is fired and as each hole is fired, it tends to dampen out previous vibrations established. There is a possibility that later on we will find other reasons for the reduced vibrations but for the present at least, this seems to be the most logical explanation, where our switch is used in shooting the stone found in our quarries.

(Mr. Miller demonstrated the dif-

*(Continued on page 114)*

| Kind of Stone | Diorite | Dolomite | Granite | Dolomite | Granite | Dolomite | Lime-stone | Trap rock | Granite |
|---|---|---|---|---|---|---|---|---|---|
| Los Angeles Rattler Test | 17 | 23 | 45 | 19 | 43 | 22 | 25 | 22 | 38 |
| Hole size (in. | 6 5/8 | 6 1/2 | 6 5/8 | 6 | 6 | 9 1/4 | 9 1/4 | 9 1/4 | 6 5/8 |
| Ft./hr. | .80 | 1.7 | .82 | 2.7 | 1.4 | 2.6 | 3.3 | 3.0 | 1.0 |
| Cost/ft. | $3.55 | $1.43 | $2.57 | $1.23 | $2.36 | $2.33 | $1.62 | $2.34 | $2.25 |
| Cost/ton | 4.8¢ | 2.8¢ | 5.5¢ | 6.9¢ | 8.5¢ | 4.9¢ | 3.1¢ | 3.8¢ | 5.0 |
| Tons/ft. | 74 | 51 | 47 | 18 | 28 | 52 | 51 | 62 | 45 |
| Tons/lb. | 7.5 | 4.9 | 3.5 | 2.6 | -- | 5.9 | 4.8 | 6.3 | 5.0 |
| Ft./bit | 2.4 | 27 | 6 | 10 | -- | 20 | 92 | 8 | 6 |

**Data submitted by representative producers illustrate variations in blasting practices and performance attained. (see page 82)**

# Plan Big Merchandising Program

## Agricultural Limestone Division, N.C.S.A., convention stresses need for more promotion

IMMEDIATELY following the 30th Crushed Stone Association, the Agricultural Limestone Division held its second annual convention. The Division now has 11 million tons represented in its membership and has shown excellent progress in obtaining new members.

### Officers

S. P. MOORE, Concrete Materials and Construction Co., Cedar Rapids, Iowa, was reelected chairman of the Division. Henry A. Huschke, managing director, and J. R. Boyd, secretary-treasurer were also reelected.

H. A. CLARK, Consumers Co., Chicago, Ill., and JOHN J. STARK, Girard, Kans., were elected vice-chairmen for the North Central and Western regions to succeed E. J. Krause and H. M. Thomas, respectively. Reelected vice-chairmen are ELLWOOD GILBERT (Northeast), O. M. STULL (East Central) and W. M. PALMER (Southern).

The executive committee comprises H. A. Clark, Earle L. Dingle, L. W. Hayes, Paul Detwiler, P. E. Heim, H. C. Krause, R. T. Willingham, S. P. Moore (chairman) and Otho M. Graves (representing N.C.S.A.). James Eells and A. Battle Rodes were elected to serve the Agricultural Limestone Division on the Board of Directors of the National Crushed Stone Association.

A complete list of the new Directors appears in the Personal News section of this issue.

The Division, through its new Board of Directors, moved to adopt a new rate of dues predicated on two dollars per thousand tons as compared to $1.25 in 1946, in order to increase its services and to cover a deficit incurred in 1946. Consensus of opinion was that production in 1947 will be larger than it has been, a favorable time to adopt a higher rate of dues for merchandising agricultural limestone in the future.

The Division is anticipating reductons in the federal appropriation for liming materials, possibly to the point of complete elimination in a few years and plans an all-out program of merchandising and promotional activity in order to build and preserve its markets. More and more promotional pieces are to be prepared and Henry Huschke is to investigate the costs of film to be made for promotional use. A resolution was passed, in anticipation of a reduction in federal funds for soil conservation, that no further reduction be made until soil requirements are met and copies are to be sent to the proper government officials.

S. P. MOORE, chairman of the Agricultural Limestone Division, in calling the convention to order, expressed his appreciation for an excellent attendance and reviewed the various activities of the Division and its committees.

MANAGING DIRECTOR HENRY A. HUSCHKE, in his annual report, covered all the activities of the Division's first year of operations. The activity that has been stressed most has been promotional work. To date two promotional folders have been prepared and many thousands of copies ordered by members for use in their work.

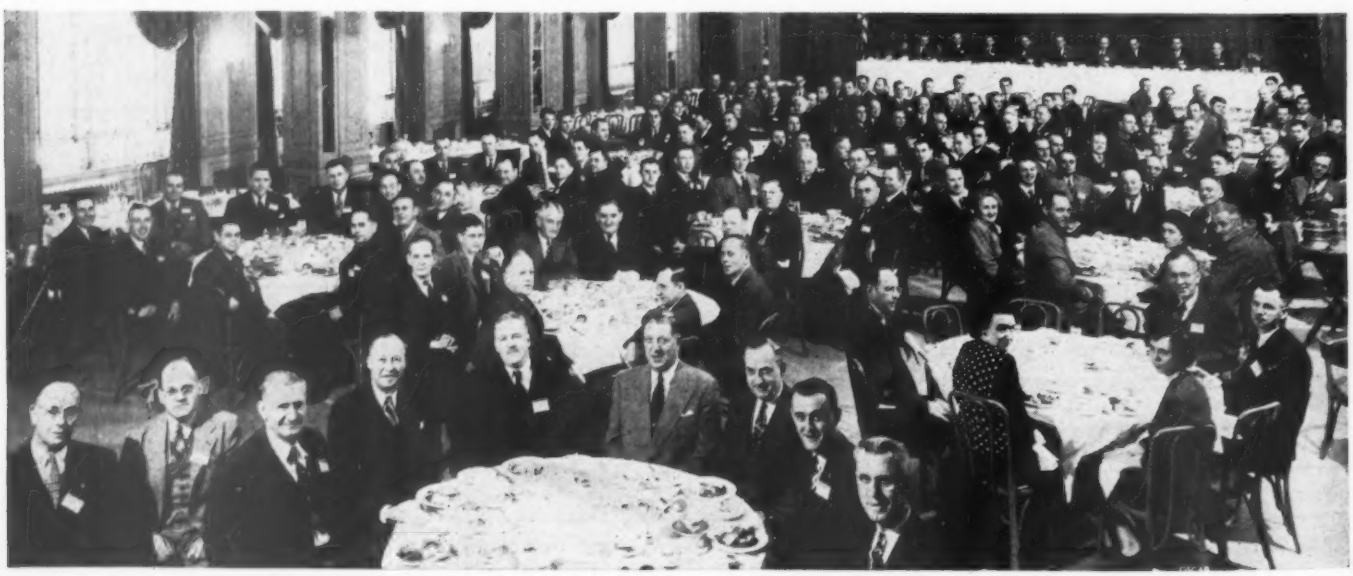
Fifty-one sets of the series of bank advertisements have been purchased by member companies and 139 sets have been requested by banks thus far. These advertisements, prepared for banks to use in their local papers, offering loans for the purchase of agricultural limestone, are proving a very worthwhile investment in the overall promotional program. The banks actually spend their money to pay for advertising of great value to the industry and, according to Mr. Huschke, appreciate the service in advertisement preparation. Basing an evaluation on the cost of advertising, he believes the Division is getting a return of five dollars for each dollar it invests in the advertisements.

A positive policy statement with respect to supporting federal financing and for soil conservation programs has been drafted and a committee on Soil Conservation Programs to implement the policy by aggressive action is now functioning.

The Division's activities in connection with freight rates were reviewed. It is believed they were instrumental in holding the freight rate increase to the reasonable figure of 15 cents per ton; also in the insertion of an escalator clause into all 1947 contracts when it was apparent that rates would be increased, permitting increases in delivered prices proportionate to rail freight increases.

The Division worked hard to secure the removal of price controls, and has prepared, with the National Lime Association, a statistical report showing the tonnages of various kinds of liming materials used.

During 1946, Mr. Huschke attended seven regional meetings of producers. He reported that there are now 11 State or area associations of agricultural limestone producers and hopes the trend will continue. These Associations are in Wisconsin, Minnesota, Iowa, Illinois, Missouri, Kansas, Texas, Kentucky, Ohio, Virginia and



Get-together luncheon of the Agricultural Limestone Division. The officers and directors may be seen at the table to the rear

Pennsylvania. Total membership is now 210, an increase of 46 for the year.

Mr. Huschke introduced members of the Field Service Division with the suggestion that producers get together with them at the convention for the discussion of mutual problems.

SECRETARY-TREASURER J. R. BOYD followed with a report of the Division's fiscal affairs. A small deficit was incurred in 1946 which, with the need for increased promotional activity, justified the adoption of an increased budget for 1947.

Sid Moore, chairman, opening the Agricultural Limestone Division meeting. Horace Krause may be seen to the left, and Phillip Heim, to the right

## Importance of Liming

SOIL CONSERVATION in all its aspects was covered thoroughly in a paper, "People, Limestone, and Land," by GRANT THOMPSON, assistant director, Field Service Branch, U. S. Department of Agriculture, presented before the Agricultural Limestone Division.

Mr. Thompson emphasized the job yet to be done in liming the nation's soils in order to guarantee future soil fertility, in which the entire nation has a vital stake, and presented a clear picture of other conservation measures that must also go forward and which must be recognized by the agricultural limestone industry and all the people, as essential to soil preservation.

Recognizing that the U.S.D.A. and the industry have profited from their close association, he emphasized that even closer cooperation will be essential in the days ahead for the attainment of the overall objective. Carefully estimated national needs total 52 million tons anually, he said, whereas the farmers used 25 million tons of liming materials in 1946. By way of contrast, he mentioned that only four million tons of liming materials were spread under the first year of the Agricultural Conservation Program in 1936. Mr. Thompson was pleased that the industry has shown interest and activity in the entire field of agricultural conservation over and above the production and distribution of its own product.

In commenting on the importance of soil conservation to our entire population, he said that the total land from which crops are harvested in the United States amounts to only 2½ acres for every person, as compared to nearly 3¼ acres 25 years ago. All of which means that our acreage of good cropland is decreasing while the population is increasing.

The primary emphasis of the Agricultural Conservation Program is on conservation practices which farmers otherwise do not carry out, he said, in pointing out that the liming program is not the only factor even though limestone is the No. 1 A-C-P practice in terms of money. Only one-fifth of the total credit earned under the 1945 A-C-P was for liming materials. The other four-fifths of the program is just as important, he said, comprising contour farming, planting of cover crops, construction of erosion control structures, terracing, etc. It is uneconomical to lime our land if other practices which will prevent erosion are not carried out.

Farmers used about 23 million tons of liming materials in 1945, of which more than 21 million tons (91 per cent) was spread with assistance of the Agricultural Conservation Program. About one-half of the tonnage used under the program was purchased, according to Mr. Thompson, by the government through direct contracts or purchase orders.

*(Continued on page 98)*

A couple of Minnesotans; E. E. Haapala, Zumbrota, left, and John F. Patterson, St. Charles

Ben P. Donnell, Valley Dolomite Corporation, and Lou Woolfolk, New Holland Machine Co.

Left to right, R. M. Seifried, Norbert Neuheisel, and W. L. Bryan, in Board meeting of Agricultural Limestone Division

Mr. and Mrs. J. F. Patterson, Patterson's Quarry, St. Charles, Minn.

# Rockwool Manufacturing
# A Featured Paper at the Canadian Institute Meeting

**New plant of Gypsum, Lime and Alabastine, Canada, Ltd., described. Non-metallic production reaches new high in 1946**

WHILE the Ottawa General Meeting of the Canadian Institute of Mining and Metallurgy, held January 20-22 at the Chateau Laurier, Ottawa, Canada, had fewer papers than usual scheduled for the Industrial Minerals Division, there were several excellent papers, some presented under the auspices of other Divisions of the Institute, of interest to the rock products industry. We were privileged to attend the meeting as a guest of the Institute, and to participate in the social functions for which those meetings are famous. The highlight of the sessions was the annual dinner address by Field Marshal Viscount Alexander, Governor-General of Canada, who paid high tribute to the Canadian mining industry for its accomplishment toward winning the war and urged that the industry keep strong its position to meet any future emergency.

## Mineral Wool

The paper of greatest interest to the rock products industry was one entitled "The Manufacture of Mineral Wool" by J. C. GILLESPIE, assistant to the general superintendent, L. V. ROBINSON, of Gypsum, Lime and Alabastine, Canada, Ltd., Caledonia, Ontario.

This concern has been a manufacturer of mineral wool, both from rock and slag raw materials, for a number of years, and Mr. Gillespie's paper considered both types in outlining the complete process of manufacture. He touched upon development of the industry, the various types of products and presented considerable operating data and fundamentals, which are outlined briefly herein.

In introducing his subject, Mr. Gillespie said that mineral wool was first manufactured 100 years ago in Wales. The first operation in the United States was at Greenfield, N. J., in 1870, using iron slag raw material, and the first large-scale operation was at Alexandria, Ind., in 1897, the argillaceous rock deposits there being the main factor in the location. Slag wool gradually was replacing rock wool before the war, he said, because slag was cheaper, easier to melt and yielded greater recovery of finished product.

The various forms of mineral wool products were described, among them batts, blankets, block types, board, felt, granules, insulating cement, loose, pipe insulation and acoustic tile. The insulating cement variety, one of several "newer varieties" was described as a dry mixture of mineral wool and other ingredients which when mixed with water to trowelling consistency is for application on heated equipment. Two types of pipe insulation were described. The blanket type is reinforced on one or both sides and is bound together into a non-rigid pipe insulation. The molded type is a rigid pipe insulation.

The thermal conductivity (K factor) of the various classes of mineral wool products, as specified, were listed as follows:

| | |
|---|---|
| Insulating wool .. | 0.27 at 50 deg. F. |
| Blanket (Industrial, high temperature) ..... | 0.41 at 200 deg. F. or 0.47 at 300 deg. F. |
| Block (for use to 600 deg. F.) .... | 0.50 at 200 deg. F. |
| Block (for use to 1200 deg. F.) ... | 0.53 at 300 deg. F. |
| Block (for use to 1600 deg. F.) ... | 0.56 at 400 deg. F. |
| Pipe Insulation (blanket type) . | 0.41 at 200 deg. F.<br>0.47 at 300 deg. F.<br>0.53 at 400 deg. F. |
| Pipe Insulation (moulded type). | 0.42 at 200 deg. F.<br>0.46 at 300 deg. F.<br>0.50 at 400 deg. F. |

In his discussion of raw materials, Mr. Gillespie pointed out that, for rock wool, the acid and basic constituents of the raw materials should be present so that their fluxing action is nearly balanced, requiring rigid control and the use of additives to maintain the desired balance. In the use of slag, already of balanced composition, he mentioned the desirability of adding small percentages of sandstone or lime materials to adjust viscosity. In the manufacture of glass wool, he said the raw materials are proportioned in the "glass composition area," using up to 15 per cent alkalies.

When argillaceous limestones are fired, the ignition loss is almost 30 per cent, he said, so that the best possible recovery is 70 per cent while, with slag, the recovery is 97 or 98 per cent. He mentioned that some manufacturers have tried fluorspar as an additive flux to slag, and nepheline syenite and serpentine to lower the melting temperature. Transportation costs prohibited economy however. The ratio of the acid constituents to the basic content should be in the range 0.90 to 1.20 according to Mr. Gillespie.

The analysis of rock wool is 40.9 per cent $SiO_2$ and 37.2 per cent CaO and, for slag wool, 38.17 per cent $SiO_2$ and 43.44 per cent CaO, according to some analyses he had made.

Low grade foundry coke is the best fuel and should be in the size range of 2- to 8-in., usually close to 4 in., for best performance.

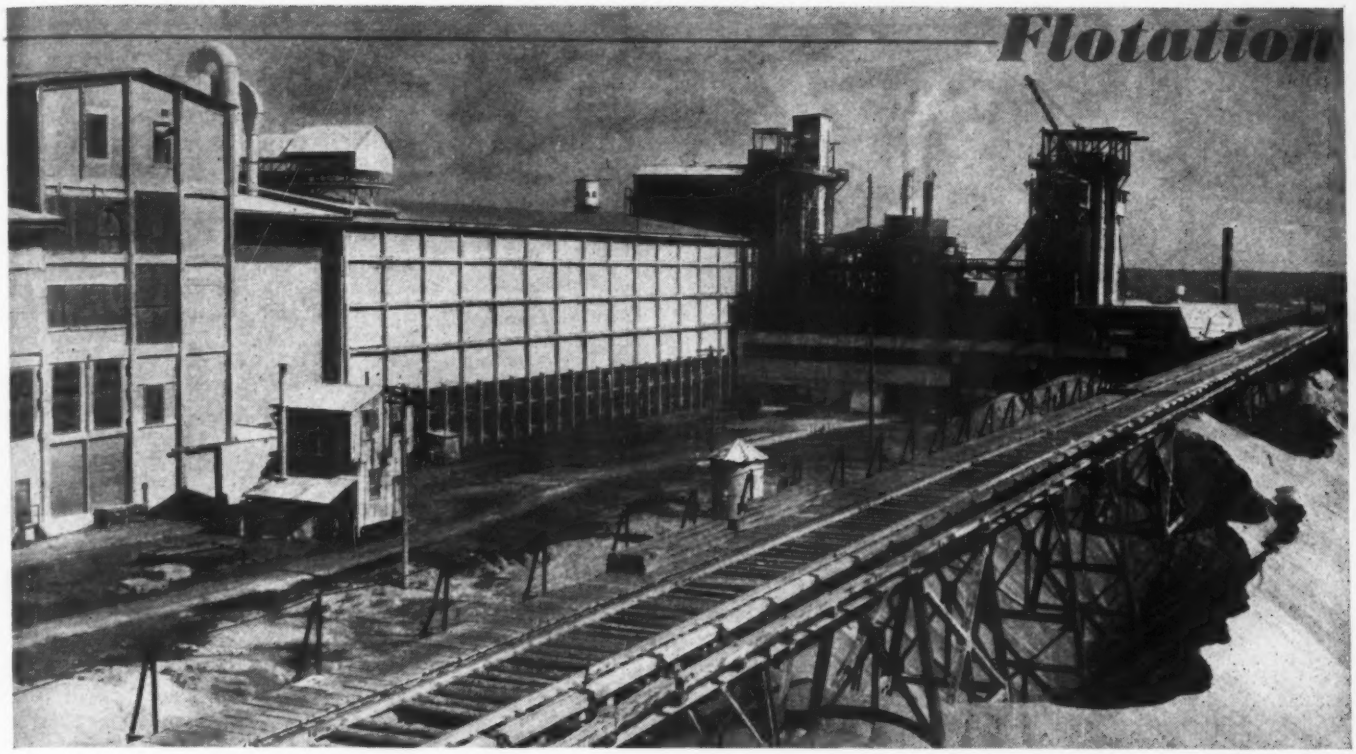
In describing plant equipment, he said that the vertical cupola is unlined ranging in size from 3 to 6 ft. in diameter and from 8 to 20 ft. in height. Air for combustion is introduced through tuyeres (6-13) at a level from 12 to 18 in. above the bottom. The water jacket usually does not extend above the bottom 8 ft.

The molten stream from the cupola may vary from a sticky, high silica stream to a fast-flowing limey liquid stream from a single charge, he said, in emphasizing the importance to accurate control of the charge.

It has been his experience that some cokes burn too high up in the cupola, raising the melting zone even to the point where the bottom cools off to form a solid glass inside the cupola. Another adverse reaction is that an uneven flow of melt results with attendant loss in quality. Another operating difficulty encountered is that coke sometimes channels, that is, it will burn out in one portion leaving frozen slag to the top of the cupola with the result that other portions have unusually high melting zones.

The coke to slag ratio is from 1:3½ to 1:6 and slide gates on the air supply from the blast fan are the means of control for the rate of burning. A 48-in. diameter cupola, properly operated, will melt 1½ to 2 tons of slag per hour along with ½ ton of coke. He mentioned attempts to recover waste heat, some plants using exhaust

*(Continued on page 110)*




Complete wet storage, drying, grinding, and dry storage system. Note trestles under which is located a continuous belt conveyor

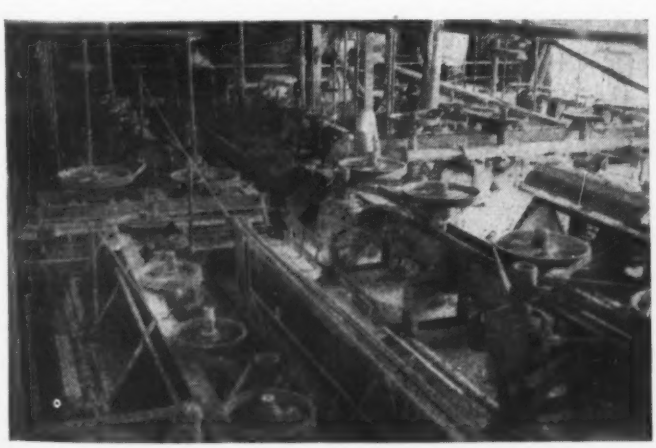
# PHOSPHATE Concentration

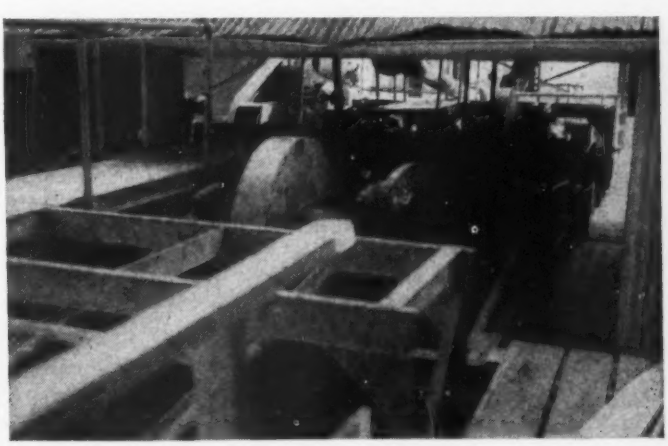
## Part 6: New flotation methods permit profitable concentration of low grade sands

By JAMES A. BARR, Jr.

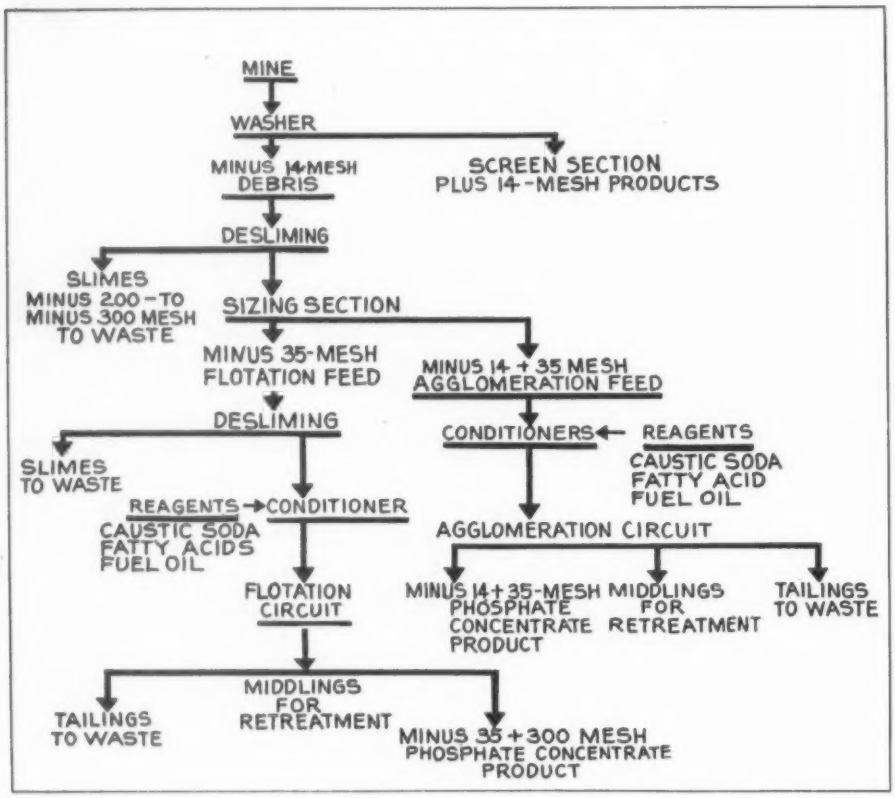
PHOSPHATE has long been classed as one of our leading non-metallic minerals. Its growth has been synonymous with the growth of froth flotation. It was indeed fortunate that froth flotation, as a method of concentration, found such an imporant industrial mineral to champion its cause through the lean years of the 1930's. For without the knowledge gained during the years between 1925 and 1935 from the exceptionally extensive and timely research programs in the phosphate and fluorspar industries, concentration methods for separating non-metallic minerals by froth flotation phenomena, in general, would have lagged ten years and the "know how" so essential during the past five years of war effort would have been sadly lacking.

On the other hand rapid expansion of phosphate requirements depleted our easily beneficiated deposits until it was absolutely necessary to look for a new method of concentration. It was well known that beyond 14-mesh, vast tonnages of low grade 30 per cent B.P.L. phosphate sands were available. During the early mining operations many millions of tons of these fines were mixed with barren overburden to be lost forever. No longer was it possible to maintain high tonnage production by simply





Left: Flotation section showing separation of the fatty acid float of phosphate from silica. In foreground is the amine flotation from phosphate.
Right: Final desliming and dewatering rake classifier




**Flowsheet for the single float**

screening out the minus 14-mesh silica containing fraction.

Flotation had been successful in metal sulfide separations, and it was natural that those who were familiar with the methods and results should turn to similar methods for concentrating the non-metallic minerals. There was many a pitfall between dreams and reality. Early results were very discouraging until the correct procedures had been guessed at, blundered upon and worked out purely by cut and try methods. After months of concentrated effort a few basic principles were recognized and non-metallic flotation was launched upon a path which paved the way for rapid development of our relatively inexhaustible low grade reserves of non-metallic minerals.

Through the past 20 years three general methods have been developed and are practiced at the present time — (1) froth flotation of phosphate from silica; (2) froth flotation of the phosphate followed by froth flotation of the silica; (3) froth flotation of the silica from phosphate.

## Phosphate Single Float

Early Florida flotation practice required only one flotation circuit to produce a medium grade concentrate by floating phosphate in the froth with anionic fatty acid reagents derived from animal fats, fish oil and more recently from tall oil, a relatively cheap by-product of the paper pulp industry.

Coarse pebble needed only to be screened at approximately 14-mesh to eliminate the silica and to produce a salable phosphate pebble concentrate. The fraction between 14-mesh and 35-mesh was a very troublesome fraction since best flotation results under slime conditions prevalent in the Florida deposits limits the maximum particle size to approxmately 28-mesh. For this fraction, there was developed a process called agglomerate tabling, a unique process which uses froth flotation reagents to agglomerate the phosphate particles. The agglomerated table feed is treated on wet reciprocating tables to produce a phosphate concentrate on the overflow side and a tailings product on the discharge end. In this manner an excellent separation can be attained even though the phosphate and silica have the same approximate specific gravity. Later the underwater screen process and the continuous belt process successfully made the separation on agglomerated phosphate.

Although this flowsheet is entirely satisfactory for Florida phosphate some changes were essential before good results were obtained on phosphate ores from Tennessee and on other domestic ores of consideraby different mineralogical character.

## Phosphate-Silica Double Float

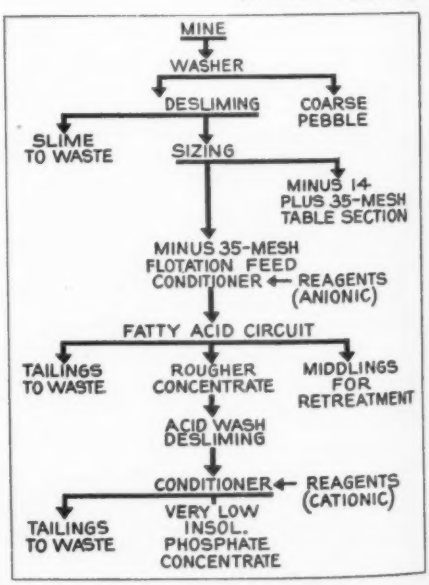
Requirements for grade of concentrate together with the necessity for maintaining high recovery of the phosphate, led to the development of a process referred to as the double-float method. Without undue regard for grade the purpose of the first circuit is to make a very high recovery of phosphate as a rougher concentrate by floating the phosphate with the well known combination of reagents; caustic soda-fatty acid-fuel oil. Flotation feed to this action contains about 30 per cent bone phosphate of lime (B.P.L.) and the rougher concentrate is increased in B.P.L. content to at least 65 per cent.

Removal of the fatty acid-fuel oil film from the phosphate particles is necessary before the double-float method will function properly. The rougher concentrates are thickened to remove some of the excessive amounts of water and then treated in conditioning mixer cells with sulfuric acid. This treatment is followed by washing and removal of the oily slimes with fresh water.

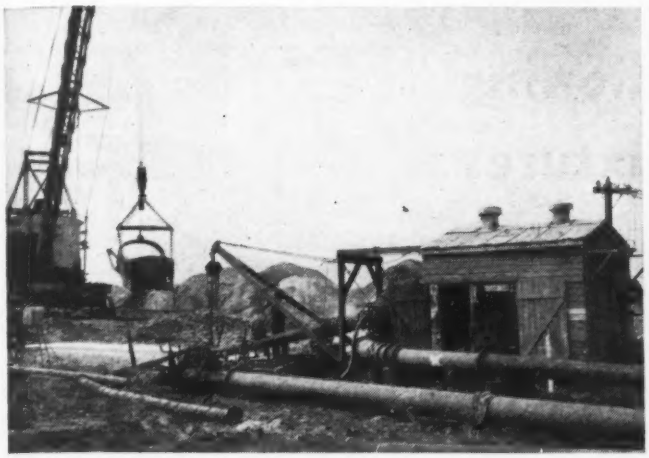
To increase the concentrate grade from 65 per cent B.P.L. to an average of 75 per cent-77 per cent B.P.L., a second circuit, operating with entirely different chemicals, is necessary. It is not uncommon to obtain concentrate grades of 82 per cent B.P.L. with an insoluble matter content of only 1.50 per cent.

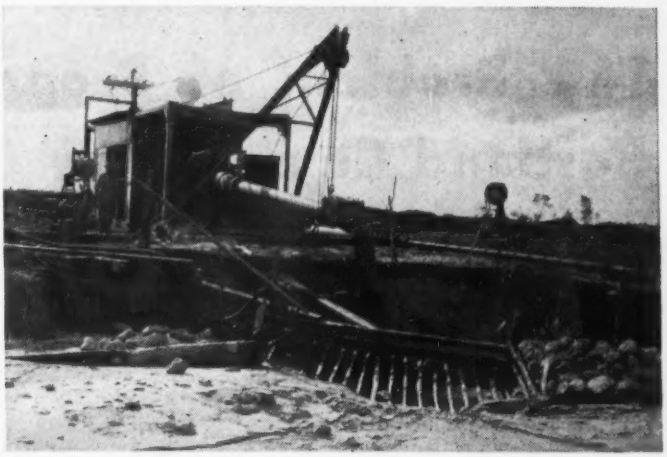
The cationic type flotation reagents were developed as specific collectors for silica and silicate minerals. Water soluble amine salts which have the same chain length as the fatty acids used to float the phosphate make it possible to collect the silica remaining in the rougher phosphate concentrate. In this circuit, phosphate is not in the froth but passes through the machines as the underflow. A silica tailing which looks like white beach sand is collected in the froth and eliminated with a minimum loss in recoverable phosphate. Losses are very low, partially because the mineral present in minor quantity is being floated but more so because of the exceptional selectivity and collecting power of cationic amine reagents which are being used.

*(Continued on page 108)*

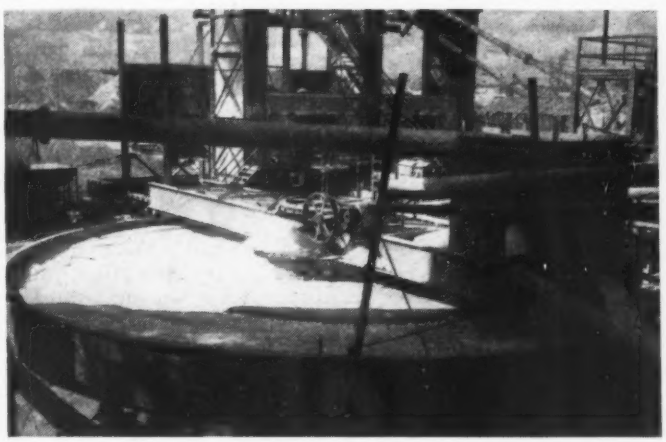


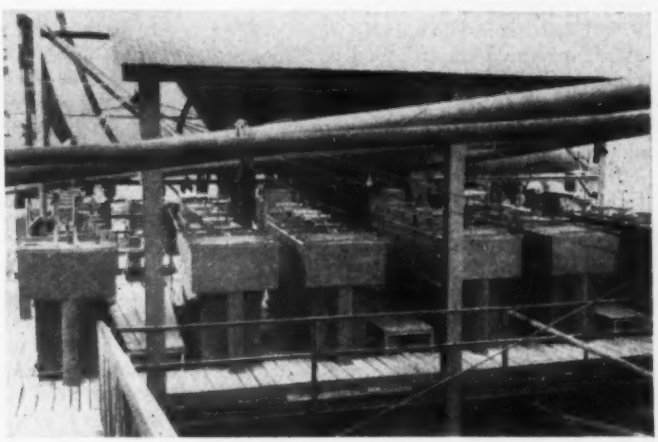

**Flowsheet for the double float**





**Left: Dragline excavation, showing pumping station for washer. Right: Close-up showing where matrix is mixed with water and pumped to the washer and flotation plant**

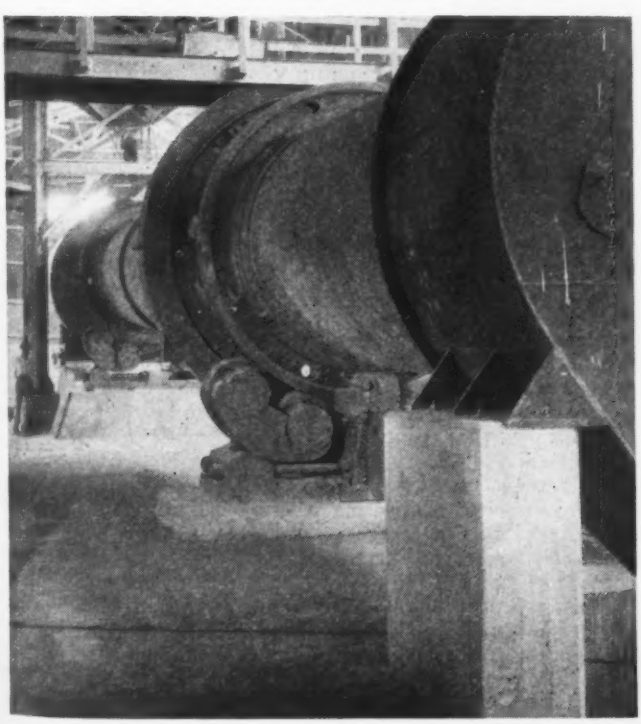


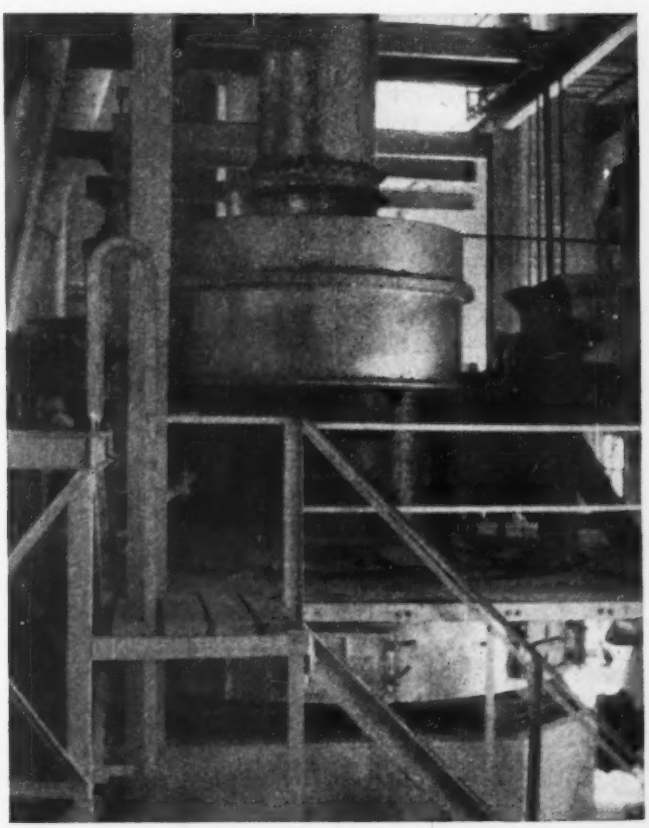


**Left: Hydroclassifier used for partially desliming flotation feed. Right: Fahrenwald section for splitting the feed between tables in flotation section**

**Right: Large ring roll mill, originally designed for coal, is employed for grinding phosphate concentrate**

**Below: Rotary dryer, 7- x 80-ft., for drying phosphate**





# The Problem of Proportioning Portland Cement Raw Mixtures

## Part III — Application to Typical Processes

By L. A. DAHL*

A VARIETY OF PROCESSES are used in preparing raw mixtures for the manufacture of portland cement. From the standpoint of the procedure to be followed in applying determinations of the carbonate requirement in control of raw mix composition, they may be classified as follows:

1. *Continuous proportioning processes*, in which the crushed raw materials move in separate streams toward a common point at which they are combined into a single stream, as shown in the flow diagram, Fig. 1. This is the only proportioning operation, the remaining operations being concerned with reduction of the mixture to a desired degree of fineness. In these processes the raw mix is usually handled in a dry condition. Control of composition in the single proportioning operation is usually unsatisfactory, and it has consequently become a common practice to blend the ground raw mixture, as shown in the flow diagram, Fig. 2. The blending operation, which will be discussed in more detail later, smooths out variations in composition.

2. *Two-stage proportioning processes.* In these processes the first stage is a continuous proportioning process of the type shown in Fig. 1. The product of this stage is proportioned again in a second stage, which is a batch process. Only a few dry process plants use two-stage proportioning. It is commonly used in the wet process, in which the raw mixture is ground wet, forming a slurry. The flow diagram of a typical two-stage process is shown in Fig. 3.

In a few wet process plants having mixing tanks of large capacity, samples of the entire quantity of slurry in a tank are taken at intervals while the tank is being filled. The lime carbonate contents of these samples are used as a basis for determining the proportions of limestone and shale or equivalent materials, at the first proportioning point (Fig. 3). This process differs from that shown in Fig. 3, since the desired carbonate content is obtained when each tank is filled, so that each mixing tank is also a correction tank. Although the actual proportioning operation is carried on at only one point, the process is equivalent to a two-stage proportioning process.

*Research Chemist, Portland Cement Association.

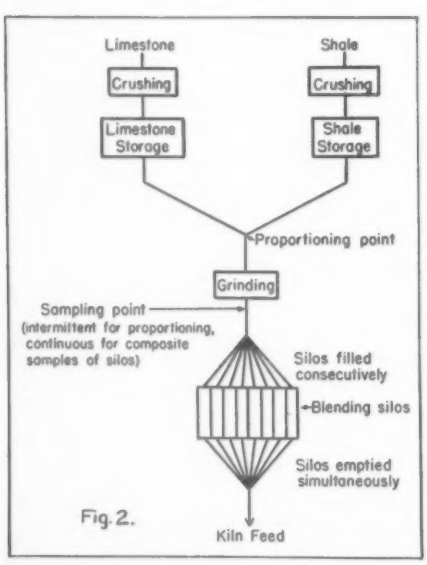



**Fig. 2: Continuous proportioning process with blending**

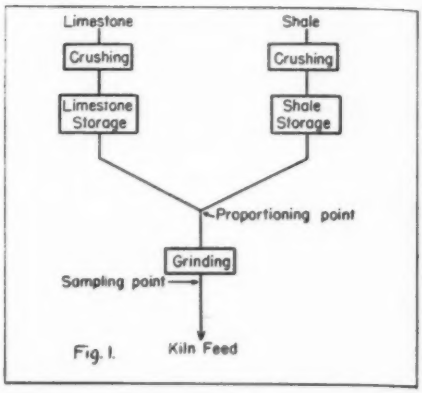



**Fig. 1: Continuous proportioning process with no blending**

### The Continuous Proportioning Process

Because of the difficulty of obtaining representative samples of raw mixtures in the crushed state, samples for control of the proportioning operation are taken from the discharge of the grinding mills, as shown in Fig. 1 and 2. As a result, the sample does not necessarily represent the product of the proportioning operation at the time the sample was taken, but represents the conditions at the proportioning point at an earlier time. By the time that the carbonate content of the sample is reported, the raw mix which it represents has passed on to the blending silos, and raw mix which has been proportioned later than the mix represented by the sample has passed into the feed bins for the grinding mills. This constitutes a "lag" in control, and this lag was the source of much of the difficulty in raw mix control in the early years of the industry. When there were abrupt variations in composition of the raw materials the effects of these variations were not observed until a considerable quantity of incorrectly proportioned material had passed from the proportioning point into the system, with no further opportunity for correction. In modern installations the lag in control is reduced, or the effects of lag are reduced to such an extent as to be negligible.

The lag in control may be reduced by reducing the capacity of feed bins for the grinding mills. The type of grinding equipment may also play a part in increasing or decreasing the lag in control. At some plants in which a large number of mills are used, the operation of one of the mills is conducted in such a manner as to reduce the lag, for sampling, while the remaining mills are operating on the same material without reference to reducing the lag.

**Reduction of the Effect of Lag in Control.** Assuming that the proportioning equipment is reliable, the effect of lag in control is due to variations in composition of the raw materials; that is, a change in composition of the raw materials may alter the carbonate content of the mix at the proportioning point. However, because of the lag in control, the need of a change in proportions is not known for some time. The condition is not remedied by improving the proportioning equipment, but it may be improved by handling the separate raw materials in such a manner as to smooth out variations in composition. For example, the limestone storage bin may be filled in successive layers at the angle of repose. If the limestone is drawn simultaneously from a series of openings along the bottom, the effect is to average the limestone mechanically, smoothing out variations in all the constituents present. This procedure not only smooths out the variations in carbonate content, but also smooths out variations in the carbonate requirement. As a result, it practically eliminates one of the greatest sources of difficulty in controlling the carbonate content with reference to the holding point, and also makes it possible to use determinations of the carbonate requirement effectively in setting the holding point.

If only one raw material is blended by an operation such as that described above, the limestone is the better

choice, since in most instances variations in limestone composition disturb control of potential $C_3S$ and $C_2S$ to a greater extent than variations in shale composition. Plants which have adopted limestone blending have found that control of raw mix composition has been greatly improved.

**Blending Ground Raw Mixtures.** When dry raw mixtures are fed into a silo, and then drawn from the bottom, the mix as drawn varies in composition in about the same way as the material fed into the silo. Very little blending occurs. To secure a blending effect, the scheme shown in Fig. 2 is commonly used. That is, the silos are filled consecutively and emptied simultaneously. At any given time the material drawn from the silos is a mixture of materials proportioned at widely different times. This contitutes a mechanical averaging, tending to smooth out variations in composition. In considering the blending effect obtainable from a group of silos it is necessary to consider composition variations of two kinds: (1) short swing variations, occurring at intervals which are short in comparison with the time required to fill a silo, and (2) long swing variations, which occur during a considerable period of time. The blending operation smooths out both short and long swing variations, but in a different manner. Formulas for estimating the blending effect obtainable from a given number of silos may be misapplied if this difference is not understood.

In applying the mathematical theory of probabilities to problems of this kind, it is convenient to express the variability in composition in terms of standard deviation. Let us suppose than $N$ silos are being filled consecutively and emptied simultaneously. The carbonate content of the entering stream varies in short swings, but there is no difference in the average composition in the individual silos, since a constant holding point has been maintained. In that case the standard deviation of the material drawn from the silos will be equal to the standard deviation of the entering stream divided by $\sqrt{N}$.

In this study we are concerned with the changes to be made in the holding point to maintain a constant potential $C_3S$ or $C_2S$ content, within reasonable limits. If the holding point is changed between silo fillings, these changes may be regarded as long swing variations. The silos differ in average carbonate content, and each is subject to short swing variations. If the previous method of estimating the blending effect is applied to the deviations from the general average for the contents of all the silos, a correct estimate of the blending effect will not be obtained. Instead, the deviations of the stream entering each silo should be the deviations *from the average for that silo*. Assuming that there are $N$ silos, with the standard deviations identical, the standard deviation of the material drawn from all the silos simultaneously will be the standard deviation obtained in this manner, divided by $\sqrt{N}$.

This principle is important in its bearing upon a method of control to be described presently, and so we propose to emphasize it by an example in which the materials in the silos are widely different in composition. Let us suppose that two silos are filled, one with material containing 85 per cent carbonates, the other 65 per cent, so that the average is 75 per cent. The standard deviation during the filling is assumed in each case to be 0.7 per cent, determined from the deviations from 85 and 65 per cent, respectively. The stream drawn from the silos simultaneously will contain 75 per cent carbonates, with a standard deviation of $0.7/\sqrt{2}$, or about 0.5 per cent. In view of the wide difference in carbonate content for the two silos, it must be assumed that they are drawn at such uniform rates that further deviations are not introduced in this operation. It may be seen from this extreme case that it would be absurd to measure deviations in the stream entering the individual silos from the general average, 75 per cent, for the two silos.

From the principles discussed, it is evident that blending after proportioning has limitations. Nine silos would be required to reduce variations to a third of the original variations, and sixteen silos to reduce them to a fourth. It may be of interest to note that eight silos would suffice in the latter case, if the blended material from four silos is blended again in the other four.

Other methods, such as circulation of material in the blending silos, and the introduction of air through porous plates at the bottom of the silo to give the dry mix the flow characteristics of a liquid, are sometimes used.

Due to limitations of the blending which may be accomplished, it is important that proportioning before blending should be sufficiently accurate to result in satisfactory uniformity in the blended product. In some instances blending silos have been installed with the idea that they will eliminate variations in raw mix compositions to a greater extent than is possible. In that case, the results are disappointing, and it then becomes necessary to use the blending silos as storage silos for a second proportioning operation; that is, when it is necessary to select pairs of silos to supply high- and low-lime mixtures to be combined to form a desired mix, the silos are not blending silos, but are used as sources of material for a second proportioning operation.

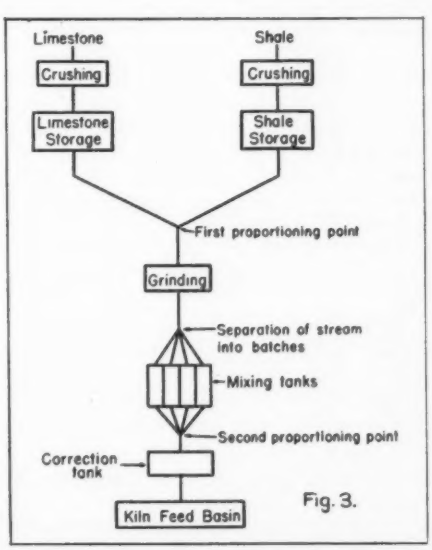



**Fig. 3: Two-stage process (wet)**

In practice, the blending operation is continuous. That is, the filling and emptying of the silos are going on simultaneously. To secure the greatest blending effect, as many silos as possible should be drawn at one time. The blending effect of eight silos cannot be obtained if only four are drawn at a time.

In describing the blending operation it was assumed for the purpose of illustration that the purpose in control is to maintain a constant carbonate content and that the blending operation smooths out deviations from that constant value. However, if the carbonate requirement changes, the holding point should be changed accordingly. If the carbonate content is maintained reasonably close to the carbonate requirement, the mix drawn from the blending silos may vary in carbonate content to a greater extent than when the holding point is not changed from time to time. However, the deviations from the carbonate requirement will be reduced by the blending operation.

Two types of blending operation have been considered: (1) blending the separate raw materials; and (2) blending the ground raw mix. The principle is the same, but the purpose is different. The first operation is intended to improve control of composition in the proportioning operation. The object of the second operation is to smooth out errors in proportioning after they have occurred. Both types may be employed to advantage.

**Sampling for Control of the Proportioning Operation.** The lag in control should be taken into account in judging the significance of tests on samples of the ground raw mix; that is, it should be borne in mind that the sample does not represent the proportioning operation at the time, but at a previous time. For example, if the time between proportioning and sampling is three hours, a sample taken at the mill discharge represents the condition at the proportioning point three hours earlier. If samples are collected from a continuous sampler at two-hour intervals, the sample represents the average condition at the

proportioning point during a period between three and five hours earlier than the time at which the sample is collected. The time intervals mentioned are not intended to represent plant practice, but serve to illustrate the importance of reducing the lag in control by collecting samples intermittently, rather than continuously, for a check on the proportioning operation. This applies particularly to continuous proportioning processes. Samples may be collected continuously for other purposes, for example, to obtain a composite sample of the raw mix in a silo or tank while it is being filled.

**Selection of Holding Points in a Continuous Proportioning Process.** It was pointed out previously that blending silos for ground raw mixtures do not eliminate short swing variations in composition but merely reduce them to a fraction of the deviations in the stream entering the silos. On the other hand, long swing variations caused by changes in the holding point are almost completely eliminated. This provides a basis for two methods of controlling the potential $C_3S$ or $C_2S$ content. In the first method to be considered, the approach to the carbonate requirement is in the proportioning operation, through determinations of the carbonate requirement daily, or twice a day if necessary, and adjustment of the holding point to correspond with it. In this method, efforts are in the direction of maintaining a carbonate content close to the carbonate requirement before the blending operation. In the alternate method, to be described presently, the approach to the carbonate requirement is in the blending operation.

In the first method, in which the approach to the carbonate requirement is in the proportioning operation, the holding point is adjusted to correspond with the carbonate requirement. In discussing the procedure it will be assumed that the raw materials vary slowly in composition, either naturally or through the manner in which they are handled. In that case, the carbonate requirement will vary slowly, so that the high and low points are several days apart. In the periods between these points the carbonate requirement is steadily increasing or decreasing. Such trends should be observed, and holding points selected to follow these trends. Suppose, for example, that the carbonate requirement is reported on successive days as 76.5, 75.7 and 75.0 per cent. If these values are selected as holding points on the three days, the carbonate content will be the same as the carbonate requirement at the beginning of each day, but will exceed it for the remainder of the day. If there is an upward or downward trend in the carbonate requirement, the holding point should be adjusted from time to time during the day, to follow the trend.

In following the trend of the carbonate requirement, it should be borne in mind that the value reported is not the value at the time of reporting, but refers to an earlier time. For example, the sample used for the determination may represent material proportioned five or six hours before the report. If the carbonate requirement is plotted against time, as a means of following the trend, it should refer to the estimated time of proportioning. During periods in which the trend is definitely downward or upward, the holding points can be kept quite close to the carbonate requirement. However, with the value determined only once a day, it may be difficult to judge when a high or low point is approached. It is at these times that the holding point may fail to approach the carbonate requirement as closely as may be desired. With adequate blending facilities these deviations can be reduced to such an extent that they are negligible.

*Alternate Method.* When the carbonate requirement varies too rapidly to permit satisfactory estimates of the trend in the carbonate requirement it is necessary to adopt a method in which these estimates are not needed. The alternate method now to be described is based upon the fact that when adequate blending of the raw mix is provided it is only necessary that the *average* carbonate content should coincide with the *average* carbonate requirement. It should be understood that these averages refer to the total quantity of raw mix in the series of blending silos at any given time. When this condition is maintained, the function of the blending operation is to smooth out the short swing variations in the difference between the carbonate content and the carbonate requirement. The method is described as follows.

Samples are taken at regular intervals at the sampling point shown in Fig. 2, for controlling operations at the proportioning point. At the same time a continuous sampling device is in operation to secure a composite sample of the stream discharged into each silo. When a silo is filled, the composite sample is used for determination of the average carbonate content and the average carbonate requirement of the silo contents. The difference between these values is the excess or deficiency of carbonates, as compared with the carbonate requirement.

Following this procedure for each silo, a record of the excess or deficiency in each silo may be kept, with the accumulative total in another column. In calculating the accumulative total any excess is added, and any deficiency subtracted. By selecting holding points to maintain the excess or deficiency of carbonates in the accumulative total as close to zero as possible, the proportioning operation is controlled to produce at most only a negligible excess or deficiency in the average composition of the entire series of silos. The carbonate content of the finished raw mix may vary, but these variations will for the most part be due to variations in the carbonate requirement, and are therefore not a matter of concern.

Blending silos frequently differ in capacity. The interstices between circular silos are commonly used, and these are of much smaller capacity than the circular silos. In such cases the excess or deficiency in each silo should be expressed in pounds, barrels or tons. For example, if a silo contains 1000 tons of raw mix, and the excess of carbonates is 1.3 per cent, this is equivalent to $1000 \times 0.013$, or 13 tons excess carbonates.

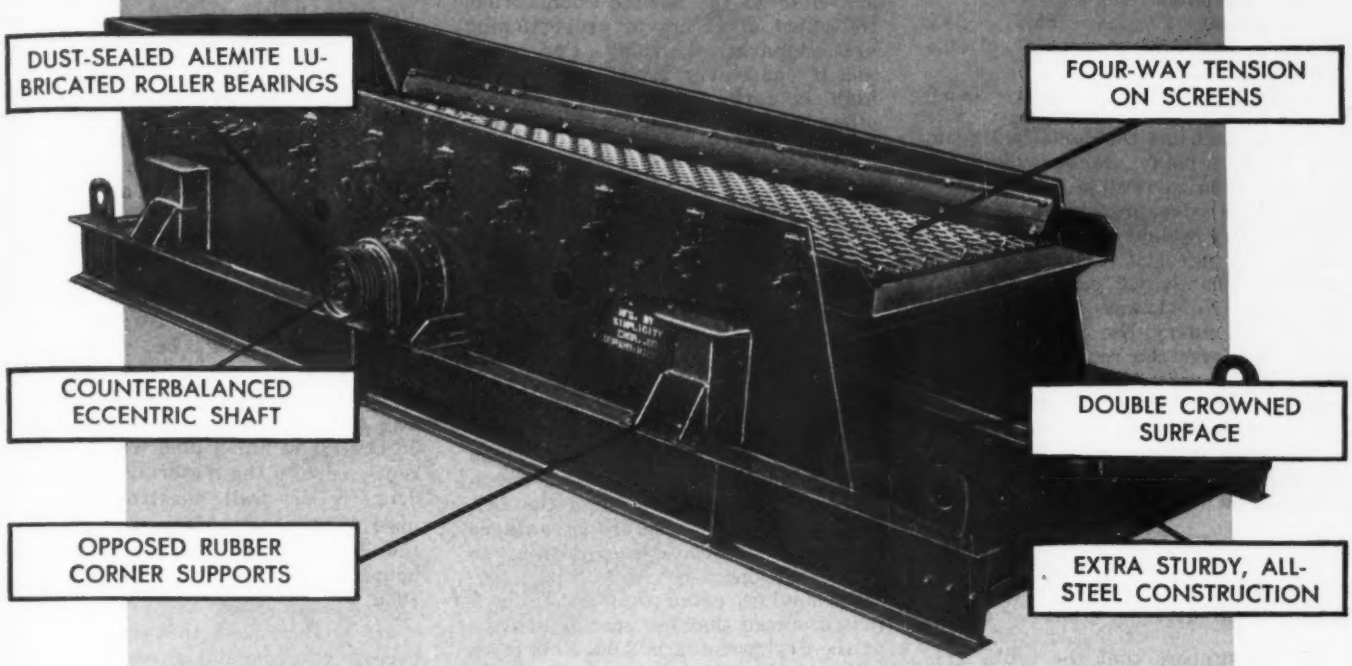
## The Two-Stage Proportioning Process

In the two-stage process the first stage is a continuous proportioning process supplying tanks of slurry to be proportioned in batches in the second stage. At some plants the first proportioning operation is performed roughly, with no effort to produce preliminary mixtures close to the desired composition, while at others weighing devices are used to obtain fairly accurate control. In either case the desired composition can be obtained in the slurry fed to the kilns, but there is a difference in the degree of accuracy required in the second stage. If the preliminary raw mixtures (slurries) are close to the desired composition, the effects of errors in percentages of the slurries in the final mixtures are small. On the other hand, rough proportioning in the first stage introduces the necessity of accuracy in the second stage. In describing methods this difference in conditions will be considered.

In most instances slurry tanks must be released for the proportioning operation too rapidly to permit complete analysis of each tank of slurry. The second proportioning operation is consequently an operation for control of the carbonate content. If the carbonate requirement is determined at suitable intervals, and the holding point selected accordingly, the potential $C_3S$ or $C_2S$ is controlled within reasonable limits. Some plants have a sufficient number of tanks to permit complete analysis of each tank before release. Under these conditions potential composition is under direct control. Methods of performing the necessary computations for this type of operation are described in Part IV. In this section it will be assumed that complete analyses of the individual tanks of slurry are not available.

Computation of proportions of slurry to obtain a desired carbonate content is not difficult. To illustrate, let us assume that the test values for two tanks of slurry are as indicated

# 3 Reasons WHY SIMPLICITY GYRATING SCREENS WILL INCREASE YOUR PRODUCTION AND PROFITS




**1. DESIGN.** Gyrating is accomplished by a counter-balanced eccentric shaft that perfectly balances the weight of the entire screen deck assembly—assuring positive, smooth action. Resilient rubber corner supports for screen impart maximum vibration and permit easy adjustment of screen to varying angles. Screen cloth is held positively taut sideways and endways, eliminating wire whip and increasing screening efficiency.

**2. CONSTRUCTION.** All steel construction, with supporting frame made up of heavy I-beams tied together with strong channels—assures maximum resistance to the shocks and strains of continuous use. Large diameter eccentric shaft is made of solid alloy steel. Complete gyrating assembly is carried by heavy duty ball or spherical roller bearings in dustproof, waterproof housings protected by labyrinth bronze seals and lubricated by alemite fittings.

**3. PERFORMANCE.** A St. Louis gravel plant screens 5,000 lbs. of aggregate every 90 seconds with a 4-deck 3'x10' Simplicity. Another plant sizes 800 tons of crushed stone per hour with a 5'x12' heavy duty double deck Simplicity. A Pennsylvania crushed gravel producer depends exclusively upon Simplicity screens to size 200 tons of high grade aggregate hourly. Records such as these are being duplicated and bettered with Simplicity Gyrating Screens—ranging in size from 2'x3' to 5'x14'—in more than 2500 plants here and abroad.

*Send us particulars of your aggregate separation requirements and we will recommend the Simplicity Gyrating Screen specifically suited to your production.*

**Simplicity**

TRADE MARK REGISTERED

**ENGINEERING COMPANY — DURAND, MICH.**

Sales Representatives in all parts of the U. S. A. • For Canada: Waterous, Ltd., Brantford, Ont. • For Export: Brown & Sites, 50 Church St., N. Y. 7

below, and that the holding point is 73.2 per cent carbonates.

| | Tank No. 1 | Tank No. 2 |
|---|---|---|
| Total carbonates (titration) ..... | 85.6 | 68.2 |
| Per cent moisture ... | 32.7 | 39.4 |
| Deviation from holding point ..... | +12.4 | —5.0 |

On the last line the deviations from the holding point are shown. These values, taken in reverse order, represent the relative proportions of slurry, on a dry weight basis, required to obtain 73.2 per cent carbonates in the mixture. That is, 5.0 parts by weight of slurry No. 1 and 12.4 parts by weight of slurry No. 2, dry weight basis, will give the required composition. These may be converted to a relative slurry volume basis by multiplying each of these relative weights by a factor obtained from Table 3. In these cases the relative volumes are obtained as follows:

| | Rel wt., dry basis | | Factor (Table 3) | | Rel. Vol. |
|---|---|---|---|---|---|
| Slurry No. 1 | 5.0 | × | 1.10 | = | 5.50 |
| Slurry No. 2 | 12.4 | × | 1.31 | = | 16.24 |

Let us suppose that the tanks are of the same diameter and that the depth of available slurry in each is 30 ft. Since slurry No. 2 is used in greater quantity, the entire 30 ft. may be used to empty the tank for further operations. The number of feet of slurry to be drawn from tank No. 1 is found as follows:

$$\frac{30 \times 5.50}{16.24} = 10.16 \text{ ft., or 10 ft., 2 in.}$$

Considering the preliminary raw mixtures on a dry basis, the effect of errors in proportions is proportional to the difference between the carbonate contents of the two materials. In this case the difference is 85.6 — 68.2, or 17.4 per cent. It will be noted that this is the same as the sum of the relative weights, as obtained directly from the deviations from the desired carbonate content. An error of 1.0 per cent in proportions of the two materials will cause an error of 0.174 per cent in the carbonate content of the mixture. For example, the percentages of slurries No. 1 and 2 on a dry basis are 100 × 5.0/17.4 and 100 × 12.4/17.4, or 28.74 and 71.26 per cent, respectively. If the actual amounts used are 29.74 and 70.26 per cent, the carbonate content of the mix will be 73.2 + 0.17, or 73.37 per cent. From this it may be seen that accuracy in measuring slurry volumes is required to control the carbonate content within 0.2 per cent. Because of the physical condition of raw mix slurry, it is difficult to measure volumes with a high degree of accuracy. It is therefore good practice to test the mixture for carbonate content, and to make such adjustments as may be required. The calculation of quantities is therefore intended only to secure an approximation to the desired composition.

When the slurries to be combined are close to the desired composition, the effect of errors in proportioning are comparatively small. For example, if one slurry is 2.0 per cent too high in carbonate content, and the other 2.0 per cent too low, the sum of the deviations is 4.0 per cent. An error of 1.0 per cent in proportions of the two slurries, on a dry weight basis, will introduce an error of only 0.04 per cent in the carbonate content of the mixture. In such cases it may be possible to combine the slurries in the calculated quantities, without depending upon further adjustments based on determinations of the carbonate content of the mixture. If the moisture contents of the slurries are not far apart, the relative proportions on a dry basis may be taken also as relative proportions on a volume basis, without applying the factors in Table 3. These are advantages secured by accurate proportioning in the first stage.

It may be noted that in Table 3 it is assumed that the specific gravity of the dry raw mix is 2.65. This is an estimate, but does not necessarily fit every case. In addition, the accuracy of the conversion is impaired by the presence of entrained air in the slurry. However, if the calculated quantities of slurry are regarded as approximate, to be checked when necessary by tests of the mixtures of slurry, the factors may be regarded as being generally applicable.

## Building Material Price Advance Small

PRESIDENT MELVIN H. BAKER of the National Gypsum Co., in a recent address at Baltimore, Md., said, "Contrary to general impressions, not all building material prices have had large advances. Some of the important building materials National Gypsum Co. makes are priced either the same or less today than in 1936." The company is now building a $6,000,000 plant in Baltimore.

Rock wool batts for a five-room house would cost the same today as in 1939 and $29.20 less than in 1936, exclusive of dealer mark-up or freight. Gypsum sheathing, he said, would cost five dollars more than in 1936. Gypsum lath would be $8.80 more today than in 1936, plaster would add 58 cents and finish lime would add 61 cents more to the materials bill. However, if dry-wall construction were used rather than lath and plaster, the gypsum wallboard for the same house would cost $17.60 less than in 1936.

Mr. Baker said that each of the periods of economic unrest following previous wars in this country have been followed by periods of prosperity and higher standards of living in America, and each was followed by a building boom that spear-headed the nation's recovery. The building industry, including furnishings and equipment, represents more than 20 per cent of the national economy.

TABLE 3—FACTORS FOR CONVERSION OF RELATIVE DRY WEIGHTS TO RELATIVE VOLUMES OF SLURRY*

| Per-cent moisture | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 1.03 | 1.03 | 1.03 | 1.03 | 1.04 | 1.04 | 1.04 | 1.04 | 1.05 | 1.05 |
| 31 | 1.05 | 1.05 | 1.06 | 1.06 | 1.06 | 1.06 | 1.07 | 1.07 | 1.07 | 1.08 |
| 32 | 1.08 | 1.08 | 1.08 | 1.09 | 1.09 | 1.09 | 1.10 | 1.10 | 1.10 | 1.10 |
| 33 | 1.11 | 1.11 | 1.11 | 1.12 | 1.12 | 1.12 | 1.12 | 1.13 | 1.13 | 1.13 |
| 34 | 1.14 | 1.14 | 1.14 | 1.14 | 1.15 | 1.15 | 1.15 | 1.16 | 1.16 | 1.16 |
| 35 | 1.16 | 1.17 | 1.17 | 1.17 | 1.18 | 1.18 | 1.18 | 1.19 | 1.19 | 1.19 |
| 36 | 1.20 | 1.20 | 1.20 | 1.20 | 1.21 | 1.21 | 1.21 | 1.22 | 1.22 | 1.22 |
| 37 | 1.23 | 1.23 | 1.23 | 1.24 | 1.24 | 1.24 | 1.25 | 1.25 | 1.25 | 1.26 |
| 38 | 1.26 | 1.26 | 1.27 | 1.27 | 1.27 | 1.28 | 1.28 | 1.28 | 1.29 | 1.29 |
| 39 | 1.29 | 1.30 | 1.30 | 1.30 | 1.31 | 1.31 | 1.31 | 1.32 | 1.32 | 1.32 |
| 40 | 1.33 | 1.33 | 1.34 | 1.34 | 1.34 | 1.35 | 1.35 | 1.35 | 1.36 | 1.36 |
| 41 | 1.36 | 1.37 | 1.37 | 1.37 | 1.38 | 1.38 | 1.39 | 1.39 | 1.39 | 1.40 |
| 42 | 1.40 | 1.40 | 1.41 | 1.41 | 1.42 | 1.42 | 1.42 | 1.43 | 1.43 | 1.44 |
| 43 | 1.44 | 1.44 | 1.45 | 1.45 | 1.46 | 1.46 | 1.46 | 1.47 | 1.47 | 1.48 |
| 44 | 1.48 | 1.48 | 1.49 | 1.49 | 1.50 | 1.50 | 1.50 | 1.51 | 1.51 | 1.52 |
| 45 | 1.52 | 1.52 | 1.53 | 1.53 | 1.54 | 1.54 | 1.55 | 1.55 | 1.55 | 1.56 |
| 46 | 1.56 | 1.57 | 1.57 | 1.58 | 1.58 | 1.59 | 1.59 | 1.59 | 1.60 | 1.60 |
| 47 | 1.61 | 1.61 | 1.62 | 1.62 | 1.63 | 1.63 | 1.64 | 1.64 | 1.64 | 1.65 |
| 48 | 1.65 | 1.66 | 1.66 | 1.67 | 1.67 | 1.68 | 1.68 | 1.69 | 1.69 | 1.70 |
| 49 | 1.70 | 1.71 | 1.71 | 1.72 | 1.72 | 1.73 | 1.73 | 1.74 | 1.74 | 1.75 |

*The specific gravity of the dried slurry is assumed to be 2.65, and the slurry is assumed to contain no entrained air. Since the specific gravity of individual dried slurries may depart from 2.65, and entrained air is usually present in slurry in variable amounts, the factors in the table must be considered as approximate values and are therefore expressed only to two decimal places.

The table is based upon the equation,

$$\text{Factor} = \frac{k[100 + (d-1)w]}{d(100-w)}$$

in which $d$ = specific gravity of dried slurry
$w$ = per cent moisture
$k$ = arbitrary constant

Assuming d = 2.65, and selecting 1.272 as a value of k which will make the factor for 30 per cent moisture slightly greater than 1.00, the equation reduces to the form,

$$\text{Factor} = \frac{48 + 0.792w}{100 - w}$$

# When you "go gunning" for high costs...

## set your sights on FRICTION!

## Let a GULF LUBRICATION ENGINEER help you find opportunities for dollar savings in your plant

EVERY year friction puts its hand in U. S. industry's pocket to the tune of two billion dollars—for repairs, lost production time, and reduced plant efficiency.

To reduce the "take" of friction in your plant, make sure that each moving part in every producing unit is scientifically lubricated.

Here a Gulf Lubrication Engineer can give you valuable assistance. He will accurately determine your specific lubrication requirements, then cooperate with your operating and maintenance personnel to install the most efficient lubrication practice. Result: less wear, fewer production lags, improved equipment performance and lower maintenance costs.

The helpful counsel of a Gulf Lubrication Engineer—and the complete Gulf line of more than 400 quality lubricants — are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office today.

**Gulf Oil Corporation • Gulf Refining Company**

*Division Sales Offices:*

Boston • New York • Philadelphia • Pittsburgh • Atlanta
New Orleans • Houston • Louisville • Toledo

GULF INDUSTRIAL LUBRICATION

Made of Acid Open Hearth Steel Wire

Round Strand
Flattened Strand
Preformed
Steel Clad
Non-Rotating

**The Service Record of this wire rope continues to make and hold friends.**

MADE ONLY BY

**A. LESCHEN & SONS ROPE CO.**

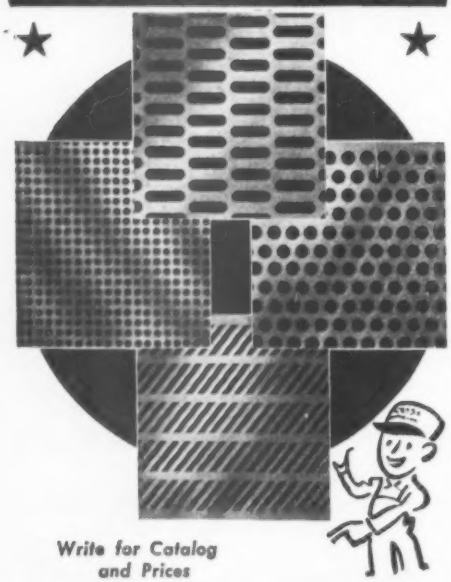
Established 1857

5909 Kennerly Avenue St. Louis, Mo.

New York — Chicago — Denver
San Francisco — Portland — Seattle

YOU CAN DEPEND ON MAXIMUM SCREENING EFFICIENCY *with*

HARRINGTON & KING PERFORATED METAL



*Write for Catalog and Prices*

The Harrington & King PERFORATING CO.

5650 FILLMORE ST., CHICAGO 44, ILLINOIS
114 LIBERTY ST., NEW YORK 6, N. Y.


## Federal Program

*(Continued from page 87)*

The policy of the Department is to enable farmers wherever possible to obtain their liming materials direct from dealers in regular cash transactions. The government does not want to participate in the business of limestone distribution, he said, in pointing to development of the purchase order plan as evidence of that policy. The ultimate goal is to pass all the distribution operations to private industry.

As to the scope of the program, that for 1947 will be similar to the 1946 program, he said, continuing to place more responsibility for developing and running the program in the hands of the county agricultural limestone committees. These committeemen need the advice of producers.

In his consideration of federal conservation budgets, he strongly urged the industry to expand its education efforts (ROCK PRODUCTS has been urging the practice for years). The President has recommended in his budget message to Congress that the 1948 Agricultural Conservation Program be on the basis of a $200,000,000 expenditure, comparing with the $300,000,000 program in effect this year. In conclusion, he again emphasized that there is a large potential market for agricultural limestone.

DR. GROVER F. BROWN, Chief, Agronomy Division, Soil Conservation Program, in his talk, "Proper Use and Care of the Land," discussed erosion control problems. Ground cover is the most important factor in erosion control, he said, in pointing out that the use of liming materials gives greater selection for cover crops that are so essential to erosion control. He emphasized that lime is important for all biological processes in the soil. His talk was illustrated by slides showing the action of water in eroding the soil.

KENNETH C. BEESON, U. S. Plant, Soil and Nutrition Laboratory, Ithaca, N. Y., spoke on "Can We Improve Nutrition Through Better Soil Practices." Mr. Beeson's work is concerned with the effect of the soil on the quality of food and feed crops and he showed, by slides, the effect on animals and crops when raised on soils devoid of proper nutrition. One point of interest was that alkalinity of the soil prevents assimilation of some of the needed trace elements (zinc, copper, etc.) in the West. He suggested that the application of limestone plus added trace elements might be beneficial.

IN a very informative paper entitled "The Efficient Use of Limestone," B. J. FIRKINS, Professor of Soils, Iowa State College, outlined reasons why the agricultural limestone industry faces a bright future and is greatly in need of expansion to productive capacity in order to keep pace with demand. His paper was based on the scientific approach to soil liming and offered much of educational value to producers of liming materials.

This paper with additional data will be published in the April issue.

WAYNE DARROW, publisher, the Washington Farmletter, gave his views and predictions based upon his Washington observations, at the Greeting Luncheon and a color sound movie "The Life of the Soil" was presented at the general luncheon through courtesy of the National Fertilizer Association.

## Food and Soil Fertility

ONE of the most interesting talks given before the Agricultural Limestone Division convention was one entitled "Food or Atom Bombs—It's Up to Us," by DR. GEORGE D. SCARSETH, Director of Research, American Farm Research Association, Lafayette, Ind. Dr. Scarseth's talk not only was thought-provoking on the subject of agriculture but was presented with a flourish and in an inimical manner with plenty of punch.

In the past, he said, we have been inclined to overlook starvation as an ill mankind must endure, where the fertility of the people has outstripped the fertility of the land. He interpreted the availability of adequate food as a means of winning peace over the world and assumed that the next war will not be started by a people that have the security of plenty of food.

Aside from consideration of liming materials, he pointed out the deficiencies in the replacement of other soil minerals. Phosphate returned to the soil is only about 29 per cent of the total lost by crop removals and soil erosion in the nation and it is Dr. Scarseth's opinion that less than 3 per cent of the potash required is being returned to the soil.

He sees more than a remote possibility that soil depletion can easily result eventually in an inadequate food supply in the United States, while the country continues to resort to inefficiency in production of crops that means low per acre yields and soil mining.

**W. T. Ragland, Jr., Superior Stone Co., relaxes in convention headquarters**

**THREE OF THE MANY BETHLEHEM WIRE ROPE CONSTRUCTIONS**

These are Bethlehem's Type W (IWRC), Type W (fiber core), and Type U (IWRC)—three commonly-used varieties. Each is made for definite jobs, and one will not necessarily do the work of the others. Get specific details from Bethlehem representatives.

Too many people figure that rope is rope, and that what is good for one machine is just as good for another. That's like saying that the mainspring of a wrist watch would work in an alarm clock.

For example, a Bethlehem Type W rope is excellent as a hoist line in many applications. It's designed for this purpose. We seldom recommend it as a dragline. There is another Bethlehem construction (Type U) that is far more suitable for most dragline service.

Similarly, it pays to get the correct size, grade, lay, and core in every instance. Each of those factors is important; each has a bearing on the life of your rope.

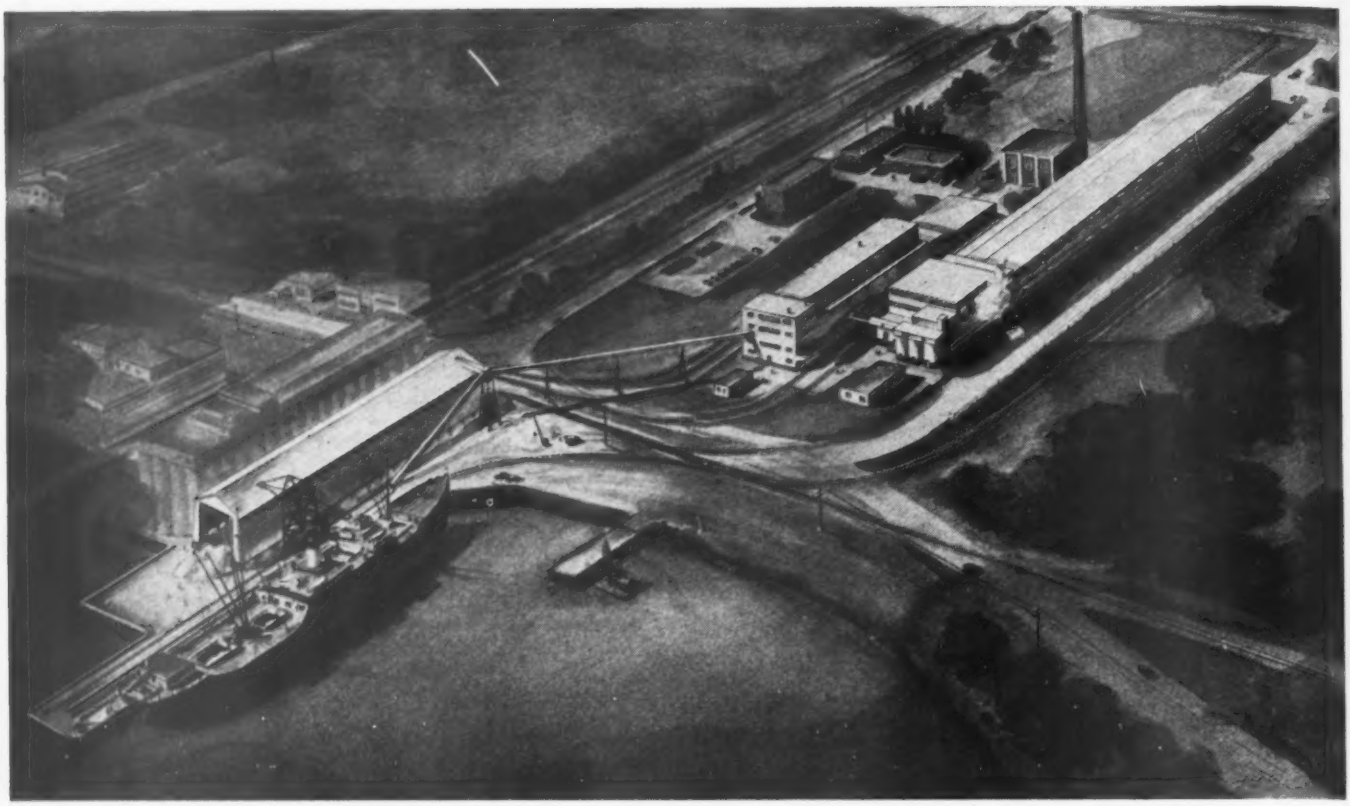
Our tip is this: if you aren't *sure* which is the right wire rope for your job, ask a Bethlehem engineer for his recommendations. This specialized service is yours for the asking, and it may save you a lot of grief—and money.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

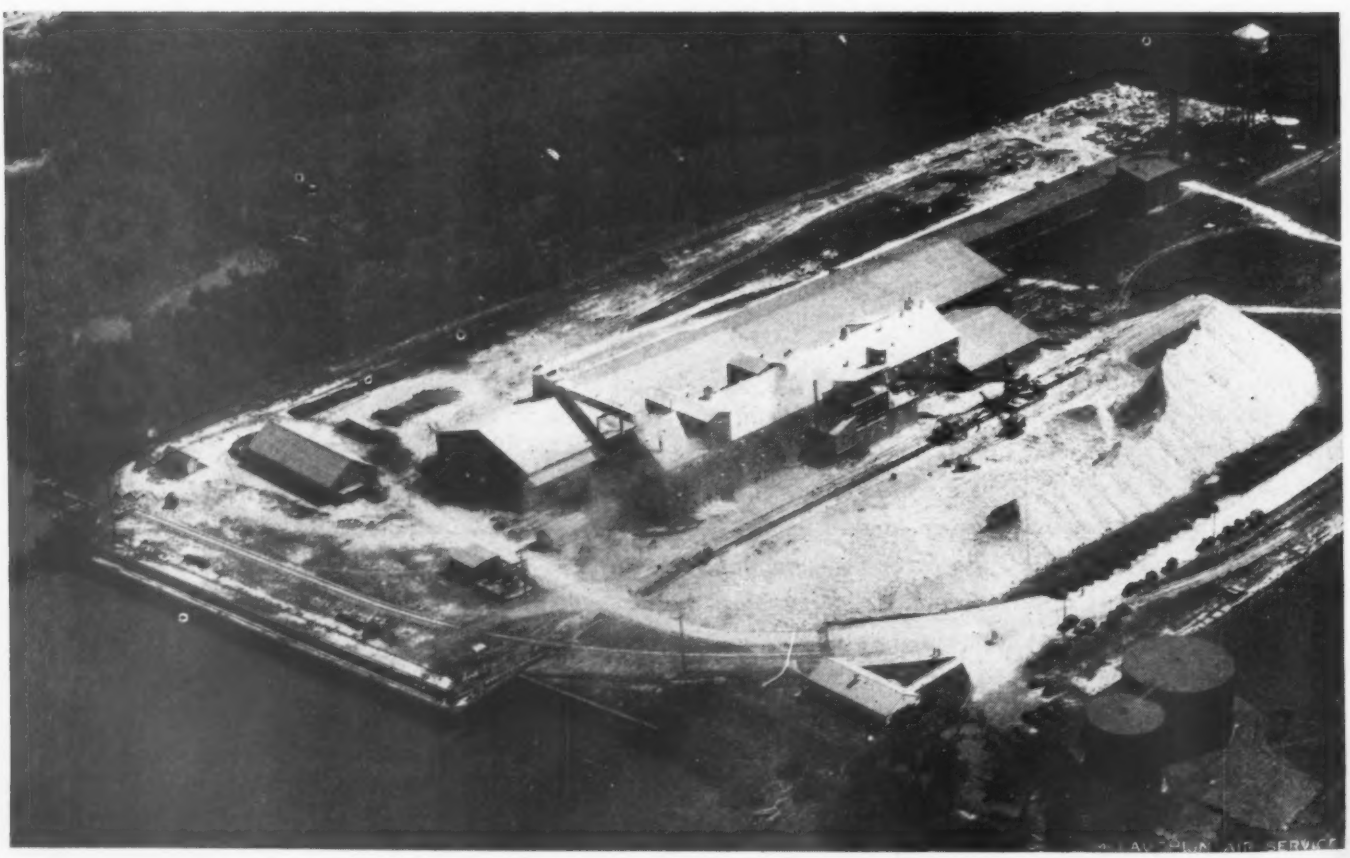
*On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation*

***When you think WIRE ROPE...think BETHLEHEM***

# NATIONAL GYPSUM'S EXPANSION PROGRAM

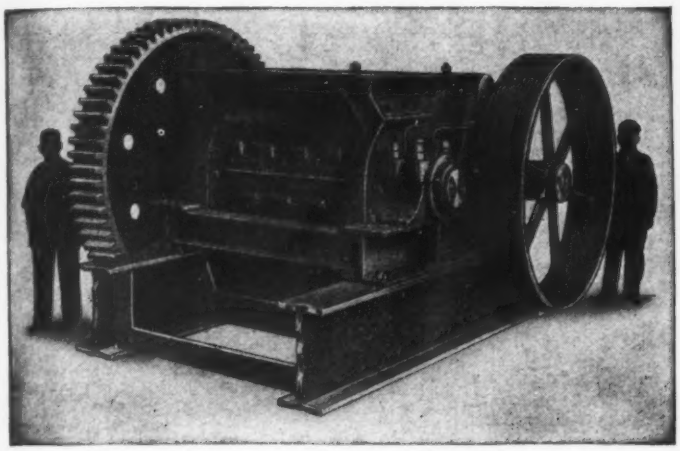


**Artist's conception of the new $6,000,000 gypsum plant at Baltimore, Md. It will have a capacity to handle 500 tons of gypsum an hour, and will include a mill building, board plant power house and office**



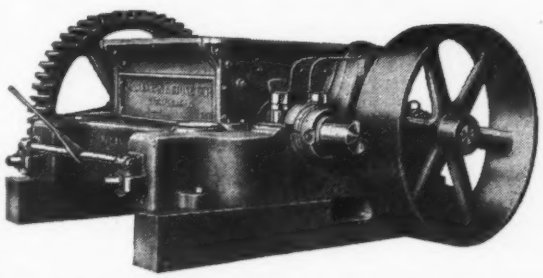
**Improvements to be made at Savannah, Ga., plant will cost about $750,000, increasing capacity and facilitating handling of materials**

# A DOZEN GOOD REASONS
## FOR CHOOSING
# McLANAHAN
## SINGLE ROLL
# ROCK CRUSHERS



**THE ROCKMASTER AUTOMATIC STEELSTRUT TOGGLE PRIMARY CRUSHER— REMARKABLE POWER AT LOW COST**

**1. All Steel Constructed 2. Cast Steel Gears 3. Automatic Steelstrut Toggle for Tramp Iron Protection 4. Chilled Alloy Iron or Steel, Interchangeable and Reversible Crushing Plate Liners 5. Hard Surfaced Steel Segment Rolls Easily Replaced Without Dismantling Machine 6. Takes Choke Feed. 7. Dry, Muddy, Wet or Frozen Material Never Packs 8. Lowest Proportion of Flats and Dust Produced 9. Slowest Speed of Moving Crushing Elements 10. Greatest Crushing *Range* With Opening Easily Adjustable 11. Takes Large Primary Sizes 12. Low First Cost—Low Power Cost—Minimum Repair and Upkeep Costs.**

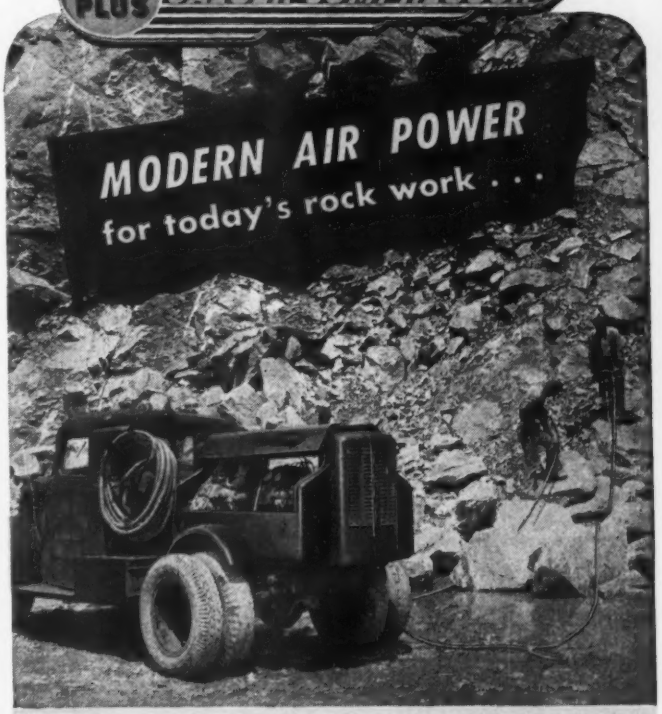


**THE STEELSTRUT SLEDGE-WEDGE CRUSHER HIGHEST TON-PER-DOLLAR VALUE!**

Modernize your present plant with modern, dependable, low cost McLanahan equipment. Write for descriptive Bulletins today.

**McLANAHAN & STONE CORPORATION**
*Pit, Mine and Quarry Equipment Headquarters*
*Since 1835*
HOLLIDAYSBURG, PENNSYLVANIA

AIR PLUS JAEGER COMPRESSOR




128 "AIR STATIONS" in U. S. and CANADA

SELL and SERVICE JAEGER COMPRESSORS

and the FINEST TOOLS to go with them.

*Send for catalog and name of our nearest distributor. He knows modern machines and methods that are helping quarrymen to produce tonnage at low cost.*

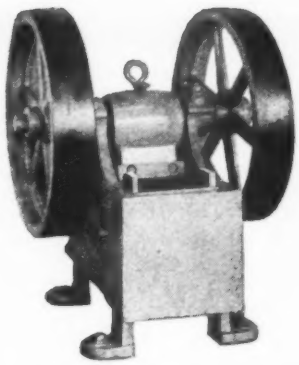
**THE JAEGER MACHINE CO.**
Main Office and Factory — Columbus 16, Ohio

*REGIONAL OFFICES*

8 E. 48th St. New York 17, N.Y. | 226 N. La Salle St. Chicago 1, Ill. | 235-38 Martin Bldg. Birmingham 1, Ala.

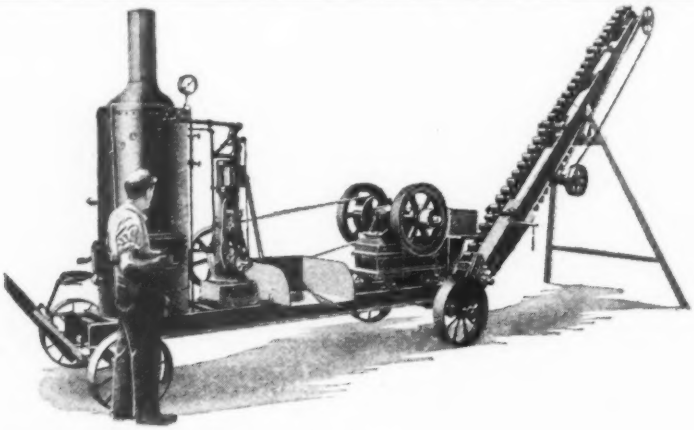
AIR COMPRESSORS, TRUCK MIXERS, PUMPS, HOISTS, PAVING MACHINES, CONCRETE and BITUMINOUS MIXERS

# Look to the Leader—UNIVERSAL



1906

*First with the overhead eccentric principle in jaw crushers. Originated by* UNIVERSAL, *this principle is today the standard of the industry.*



1910

*The First* UNIVERSAL *Portable Crusher, complete with overhead eccentric jaw crusher, power, bucket elevator and truck.*

1947

*First in Engineering with* UNIVERSAL *"STREAM-FLO" Design, resulting in higher capacities, lower operating costs, and greater profits. The* UNIVERSAL *293-Q Pacemaker Quarry Plant.*

# Look to UNIVERSAL First

**UNIVERSAL ENGINEERING CORPORATION**

**617 C AVENUE N.W.** **CEDAR RAPIDS, IOWA**

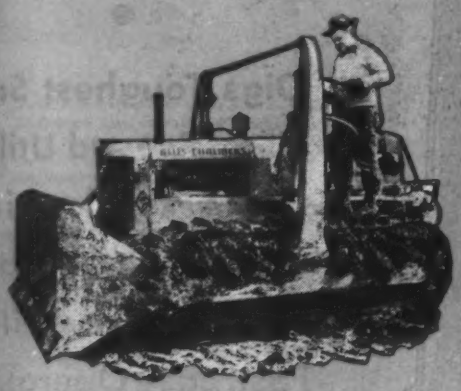
40 YEARS OF PROGRESSIVE SERVICE TO THE CRUSHING INDUSTRY

# ALLIS-CHALMERS

# First Again

# NOW WITH 1,000 HOUR LUBRICATION

Truck Wheels
Front Idlers
Support Rollers



**GREASING JOB IS EASY FOR THIS OPERATOR**

. . . no fighting through mud to reach truck wheels, front idlers and support rollers! With Allis-Chalmers' 1000-hour truck assembly lubrication, operator can select convenient time and spot to replenish lubricant.

"GOODBYE" to old-fashioned, expensive, time-consuming tractor maintenance methods.

NOW . . . truck wheels, idlers and support rollers on all Allis-Chalmers crawler tractors are GREASE-PACKED at the factory. Lubricant needs only to be replenished . . . not replaced . . . once every *1,000 hours*. That's . . . ONCE IN SIX MONTHS . . . on a 40-hour week basis! This long interval is made possible by taking full advantage of the improved Positive Seal, *exclusive in A-C tractors.*

What it means! Relieves you of the responsibility of frequent lubricating attention . . . results in less down time for greasing or repairs . . . considerably reduces lubricant cost . . . adds a factor of safety by assuring adequate lubrication for long operating periods. Result — your maintenance cost is reduced and tractor operating life extended.

For the full story of this and other features which make Allis-Chalmers tractors steady, high yardage movers, contact your Allis-Chalmers dealer.

**ALLIS-CHALMERS**
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

# ANOTHER GREAT TRAXCAVATOR

REG. U. S. PAT. OFF.

**Digs • Grades • Loads**
**Carries • Bulldozes**
**Backfills • Spreads**
**Casts • Levels • Strips**

●

**Digs Toughest Soils**
**Year-Around Utility**
**High Production**
**Low Yardage Costs**
**Complete Visibility**
**Fast, Easy Operation**

HERE'S the newest member of the famous TRAXCAVATOR family, the Model T-6 — climax of 20 years of tractor-shovel building . . . Brings to excavating, dirt-moving and material-handling fields, a new measure of multi-purpose utility and low production costs.

It mounts on the "Caterpillar" D6 tractor and is engineered to utilize most efficiently the full power, speed and work capacity of that renowned tractor . . . over 16,000 pounds of tractive effort that digs full loads in toughest soils . . . quick reverse, unequalled visibility and sure-footed balance that spells high-speed, low-cost digging, loading, grading and moving of earth or loose materials . . . ability to load big hauling units or small dump trucks with equal ease.

TRAXCAVATORS are the only full and complete line of tractor-excavators . . . there's a size for every job and purpose . . . and both TRAXCAVATORS and tractors are sold and serviced by your TRACKSON-"Caterpillar" dealer. See him today about the T-6 and other sizes of TRAXCAVATORS, or write direct for facts to TRACKSON COMPANY, Dept. RP-37 Milwaukee 1, Wisconsin.

## TRAXCAVATORS ARE PROFIT-MAKERS

# Years mean little to a GM Diesel

Here's old No. 167, an engine made years ago. For the first part of its life, it powered a truck. Since 1941, it has been mounted on a barge, working at another tough job.

Belted to a 6" centrifugal pump, No. 167 is sucking up tons of sand and water from a depth of 50 feet and tossing it high into a sand hopper on the beach.

It's a good example of how these General Motors Diesels, with power at every downstroke, stand up and take any job in their stride. Any owner will tell you about their economy both in fuel and maintenance—their ease of starting, and their quick pick-up under load.

All kinds of construction work can use efficient, portable power like this. So whatever the job you have, be sure to find out what GM Diesels can do for you.

*Sand and gravel pump of the Paul Christensen Sand and Gravel Co., Fremont, Nebraska. The GM Diesel drives the pump and handles the crane that lifts and lowers the suction head 50 feet below.*

GM
GENERAL MOTORS
DIESEL POWER

**DETROIT DIESEL ENGINE DIVISION**

DETROIT 23, MICH. • { SINGLE ENGINES . . *Up to 200 H.P.* / MULTIPLE UNITS . . *Up to 800 H.P.*

GENERAL MOTORS

***DIESEL BRAWN WITHOUT THE BULK***

# Some Basic Principles Concerning Asphaltic Concrete

## Presented before the N.C.S.A. Convention

By GEORGE H. DENT*

BEFORE PROCEEDING with the discussion of the principles of the design of asphalt mixtures and selection of materials, Mr. Dent gave a brief description of the present grades of asphaltic materials which are classified as follows: (A) asphalt cements; (B) slow-curing residual asphalt oils (sometimes referred to as road oil); (C) cut-back asphalts; and (D) emulsified asphalts.

Mr. Dent pointed out that the trend today is toward the use of heavier products due to the availability of the small portable steam boiler, designed specifically for tank-car heating. Procedures and materials, however, are determined by local conditions. In most cases, the substitution of the heavier 4 and 5 grades of cut-back asphalts and SC products in place of the lighter 2 and 3 grades will usually be more satisfactory. With the development of the modern portable asphalt mixing plant and the mechanical spreader, it is now often possible to place stationary plant mixtures at but little more cost than by the mixed-in-place method wherever the volume of work is of such amount as to absorb the overhead expense incidental to plant investment. Mr. Dent then launched into an interesting discussion of the design of asphaltic concrete.

### Design of Asphaltic Concrete

"Hot-Mix asphaltic concrete (which includes all aggregate gradations) is considered to be the most durable and the most adaptable of all bituminous pavement types. Yet a number of fallacious notions prevail about it, and at times lead to unnecessary costs and delays. Some of them lie in the carry-over from the earlier days of certain requirements which were not always based upon sound analysis. For example, the first designs of sheet asphalt were predicated upon the experience of eastern cities such as New York and Philadelphia. It so happened that the sands available in these areas were of high natural stability, and it was thought that this quality was derived largely from gradation of the particles. Accordingly, specifications were written to the effect that an asphalt sand must have a certain gradation. As sheet asphalt was adopted by other cities, sands often were imported over long distances in order to comply with such specifications, whereas there were local aggregates available which would have been entirely satisfactory either in themselves or modified in only a slight degree by the addition of some other aggregate. The addition of a small per cent of stone sands to unsatisfactory natural sands often will change them so that they may be even better than so-called standard sands.

"This practice is now becoming widespread, and in many instances stone sands are being employed entirely as the fine aggregate. The point to be made is that, consistent with durability, local materials should be used to the fullest extent and that the criterion of suitability is not gradation alone but rather the quality of the end product. This, of course, requires testing of the final mixture and evaluating its qualities in comparison with service needs. Such tests have been devised, correlated with service behavior, and should be in general use. While gradation is a useful means of generally describing aggregates and mixtures, the utmost economy in design consistent with needed density and stability can be obtained only by appropriate laboratory studies, rather than by blind reliance on gradation alone. These laboratory studies will indicate not only the composition of the mixture which will best employ the aggregates available under ordinary conditions, but will serve to develop any needed special mixtures for extra duty conditions. Sometimes this will involve blending of aggregates to obtain the necessary qualities; often it will involve only an adjustment of the different proportions. For example, the ordinary street or airport runway does not require more than average stability mixtures to remain smooth under traffic, but the bus stop or the taxiway may require more strength. In the first instance a Hubbard-Field stability of 2500 may be more than adequate, whereas in the second case the values should be 4000.

"It is quite possible to make asphaltic mixtures which will have both high tensile and compressive strength. Bituminous concrete has been constructed having a tensile strength of several hundred pounds per square inch. This is usually brittle, with consequent cracking of the surface under temperature changes. However, it is entirely practicable and desirable as a matter of routine design to make mixtures which, when compacted, will have definite load supporting power and without sacrifice of the desirable qualities of toughness and elasticity.

"A study made last year on airport pavements developed the not surprising fact that the asphaltic concrete surfaces placed upon some fifteen fields were of such variable character that measurements of the angle of stress distribution showed values varying from 0 deg. to 58 deg. A little calculation will indicate just what this means in regard to strengthening an old pavement or a new base or subgrade. Take the contrast between two mixtures, one of low stability and no ability to spread the load, and a high stability design with stress distribution at 45 deg., each 3 in. thick. In the first case, with a unit load of 100 p.s.i. (as sometimes the case with a heavy truck) the unit load on the base is still about 100 lbs., whereas under the high stability pavement it is only 50 lbs.

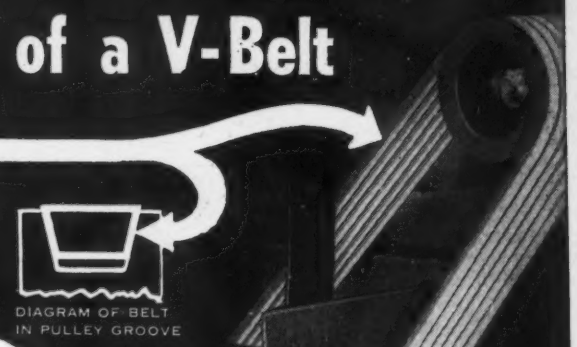
"A recent survey of construction practices throughout the United States develops the surprising fact that few states or other design agencies attempt to design bituminous mixtures on any other basis than gradation or by general guessing. If the aggregates are naturally strong, they obtain stronger pavements than if the aggregates in use are inferior and have not been improved by modification of proportioning and addition of new aggregates. This undoubtedly accounts for the reported variation in behavior in different parts of the country, and the extraordinary thing is that so few pavements have given trouble from lack of stability. However, that is no excuse for failure to develop the full potential values from the materials employed.

"Another characteristic of asphaltic concrete which varies greatly is that of density. Density determines the degree of waterproofness of a pavement. It also has a marked influence on the wear resistance of a pavement. The influence of climate is exceedingly important with regard to the latter. A coarse-textured, open pavement which will be quite satisfactory in the south and west may wear very rapidly under the chain traffic and ice conditions of the north.

"Generally, mixtures containing small percentages of asphalt may have a higher stability than those containing large amounts. However, they may not be sufficiently dense to meet traffic requirements. In designing a mixture the minimum needed stability should be determined first, and then consistent with this stability, the largest possible amount of asphalt cement should be placed in the mixture because that is what makes it durable. Sometimes, however, the addition of more asphalt to a low-stability mixture will increase its stability. This is true of some sands as well as coarse aggregates, where normal percentages of asphalt may produce low stablities. With some sands, when the asphalt is increased to as much as 14 per cent, the mixture will have a stability equal to that required for the heaviest-traffic streets."

*District Engineer, The Asphalt Institute

# You Can SEE That It's ONLY the SIDE of a V-Belt That Grips the Pulley and Gets the Wear!

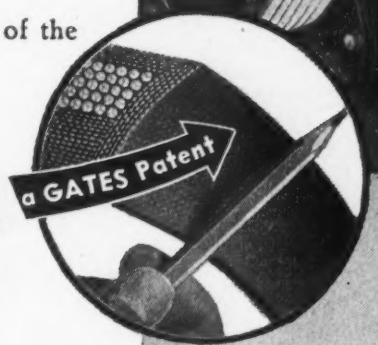



Look at a V-Belt in its sheave and you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole*. And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That is why you have always noticed that the sidewall of the ordinary V-Belt is the part that wears out first.

## —and Here Is How the CONCAVE SIDE *REDUCES Sidewall WEAR and Lengthens Belt Life!




Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

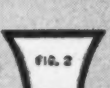
The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

**You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.**

Gates V-Belt with Patented Concave Sidewall




Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

**No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!**

## *More Important NOW That STRONGER Tension Members are Used

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

**THE GATES RUBBER COMPANY Denver, U. S. A.**

***"World's Largest Maker of V-Belts"***

473

**GATES VULCO ROPE DRIVES**

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates

THE MARK OF SPECIALIZED RESEARCH

Extrusion brings these welding advantages to NEW COATED STOODY SELF-HARDENING

*For Hard-Facing all earth-working equipment.

- Excellent Arc Characteristics
- AC-DC Application
- No Slag Interference
- Self-Lifting Slag
- Solid, Dense Deposits
- Wide Amperage Range on Welding
- More Rapid Deposition Rate
- Complete Uniformity
- Freedom from Moisture Absorption
- Can be Welded in All Positions
- Same Hardness and Wear Resistance on Multiple Deposits

Try the new EXTRUSION COATED STOODY SELF-HARDENING on your wearing equipment . . a low-cost hard-facing rod that provides maximum resistance to impact and abrasion—with improved welding characteristics! Over 600 U.S. Dealers.

Free Guidebook—Shows 125 proven applications of Coated Stoody Self-Hardening for maximum life increase on heavy equipment.

STOODY COMPANY
1129 W. SLAUSON AVE., WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Retard Wear Save Repair

Phosphate export shipping facilities at Tampa, Fla.

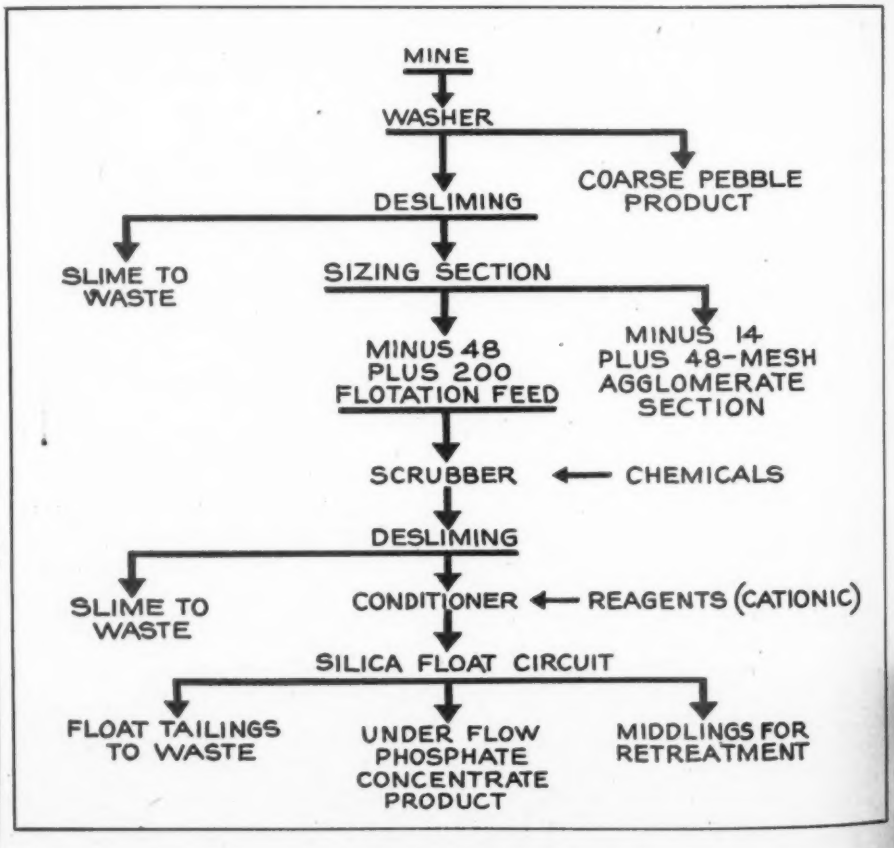
## Flotation

*(Continued from page 90)*

To date the direct silica float has not been developed far enough to determine the advisability of converting entire plants or sections of a plant to use the inherent qualities of cationic type reagents to full advantage. There are many things in favor of a single cationic circuit even now if the flotation feed is thoroughly scrubbed and deslimed of all clay-like slime particles which interfere so much with the attachment of cationic reagents to quartz and siliceous minerals. Reagent consumption is subject to the particle size of the minerals being floated, and for this reason a successful cationic circuit should, for maximum efficiency, treat ore ground to pass through 35-mesh. This condition is not always possible if market requirements are to be met. The increased amount of reagent may be doubled without seriously upsetting the economics of the direct float method for, under proper conditions, 0.5 lb. of a cationic reagent produces a very high grade concentrate at a ratio of concentration of 3 to 1. Under proper conditions, the cationic reagents will froth float 20,000 lb. of quartz per pound of flotation reagent used.

Flotation will continue to play an important roll in beneficiation of the finer grain sized low grade deposits. As the coarse pebble reserves are depleted, flotation methods will maintain tonnages at high levels by making it possible to concentrate even lower grade ores in the Florida area and to concentrate the vast reserves of our Western states.

EDITOR'S NOTE: the next article by James Barr, Jr., will describe flotation in the barites industry. Succeeding articles will deal with fluorspar, silica, and other non-metallic ores.




Flowsheet for direct silica float

# FOR THE BIG QUARRY TONNAGE AHEAD... *MARION*

## *OFFERS THESE 3 FAST, POWERFUL MACHINES*

NEVER, in the history of the Quarry Industry, has there been such a huge backlog of materials to be moved. And never, in the history of power shovel development, has there been available better, bigger, faster, and more efficient shovels to handle it than the 93-M, 111-M, and the 151-M, all designed and built by MARION. These 3 machines were built by MARION in anticipation of the inevitable pile-up of millions of tons of tough digging so that they would be ready TODAY, when they are needed most.

Find out why these new MARIONS are best fitted for the big quarry production ahead. Write for complete information.

# MARION

## POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

*Offices and Warehouses in all Principal Cities*

RYERSON STEEL IN STOCK

Call Ryerson when you need steel—any kind, shape, or size. Large stocks are available at eleven convenient plants. Ask for a Ryerson Stock List—your guide to quick shipment of steel.

*Principal Products Include:*

Bars • Plates • Sheets • Structurals
Inland 4-Way Floor Plate • Mechanical Tubing
Boiler Tubes • Hi-Bond Reinforcing Bars
Allegheny Stainless • Alloy Steels • Tool Steel • Babbitt Metal • Wire • Chain
Bolts • Rivets, Etc.

**JOSEPH T. RYERSON & SON, Inc.**

*Steel-Service Plants at:*

CHICAGO, MILWAUKEE, DETROIT, ST. LOUIS, PHILADELPHIA, CLEVELAND, PITTSBURGH, CINCINNATI, BUFFALO, NEW YORK, BOSTON

## Canadian Meeting

*(Continued from page 88)*

gases from the stack to preheat the boiler water while others use this heat for heating the air introduced through the tuyeres.

As high a temperature as possible should be carried in the water jacket, for greatest operating efficiency.

Melting temperatures range from 2000 deg. F. to 2600 deg. F. at the point of runoff of the stream and the wool is blown by steam at 80 to 1000 p.s.i. pressure from a V-shaped blow cap. Airblasts have been employed as well for fiberization, he said. A first class wool will contain 25 per cent shot, which is a definite loss.

In commenting further on the melting and blowing process, he said that the industry must compromise between the low viscosity of stream needed for large production and the higher viscosity of stream necessary for quality of fiber. A low viscosity stream will yield a short-fibered fluffy wool, while a viscous stream will yield a large diameter fiber that is harsh and brittle. Both will contain a great deal of shot. Fiber characteristics, according to Mr. Gillespie, are influenced by the viscosity of the melt, temperature of the melt, the blast pressure, the shape and size of the blowcap and by the chemical composition of the raw materials (and its effect on cooling).

The average wool has fibers ranging from 1-10 in. in length and from 5-30 microns in width, while the shot ranges from 30 microns to ⅛-in. in size.

Blow changers, the continuous collecting conveyors, and the cutting and packing of batts were described briefly. Swirls and the areas of calm, etc., in collecting chambers are troublesome problems in connection with fabricated mineral wool products. Then followed a brief discussion of binders and the setting of them through heat application.

In conclusion, he said that a cupola with a production of 36 tons of processed semi-rigid wool per day (insulating an area of 85,000 sq. ft. 3 in. thick) consumes 36½ tons of slag, 8 tons of coke, 550 gal. of fuel oil for curing the binder and 22,000 lb. of steam for fiberizing the wool. Twelve men would be required per shift.

### Non-Metallic Statistics

According to the preliminary report on the mineral production of Canada for 1946, the output of structural materials was greater than in any other year, the total evaluation being in excess of $61,000,000. Cement production increased to 11,415,167 bbl. as compared to 8,471,679 bbl. in 1945. Lime production remained practically the same, at a figure of 824,609 tons in 1946. Sand and gravel production increased from 29,750,000 tons in 1945 to 36,223,000 tons in 1946, and stone production increased from 6,205,000 tons to 6,846,000 in 1946.

The non-metallics produced were valued at $41,987,000. Output of asbestos rose from 466,897 tons valued at $22,805,157 in 1945 to 549,497 tons valued at $24,490,695 in 1946. A sharp increase was recorded in the production of gypsum, output increasing from 839,781 tons valued at $1,783,290 in 1945 to 1,833,717 tons valued at $3,226,000 in 1946. It is of interest that over 70 per cent of the world's tonnage of asbestos fiber comes from Canada where 5000 men are employed in the industry.

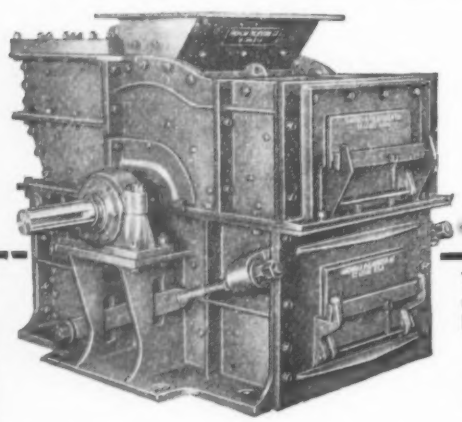
### Aluminum Therapy

Development in the use of aluminum therapy was outlined in a talk, "Aluminum Therapy and Silicosis Prevention" by W. B. Robson and A. W. Jacob presented in a meeting of the Metal Mining Division. The process is authorized for use by McIntyre Research, Ltd., a non-profit organization organized by McIntyre-Porcupine Mines and for which R. J. Ennis, head of that company and president of the Canadian Institute of Mining and Metallurgy is largely responsible. Appropriate tribute was paid Mr. Ennis for this humanitarian work at an Institute luncheon.

Canada has been making great

*(Continued on page 112)*

**The New AMERICAN "ACS" Offers a Great Advance in Heavy Duty Crushing . . .**



American ACS Crushers are built for high capacity, heavy duty production with individual size control assuring a uniform run of desired sizes from roadstone coarseness to agstone fineness in the same run with accurately governed ratios. Center feed for high ratio of fines and front feed for minimum fines. Capacities up to 250 TPH.

American ACS features sturdy sectional construction, dust-tight machined joints. All crushing parts of extra heavy manganese steel.

Typical screen analysis for limestone produced by ACS crusher using 2½" grate bar openings:

- 4.4% passing 2½" screen retained on 1½" screen.
- 13.2% passing 1½" screen retained on 1" screen.
- 18.7% passing 1" screen retained on ¾" screen.
- 19.8% passing ¾" screen retained on ½" screen.
- 16.5% passing ½" screen retained on ¼" screen.
- 13.2% passing ¼" screen retained on ⅛" screen.
- 14.2% passing ⅛" screen.

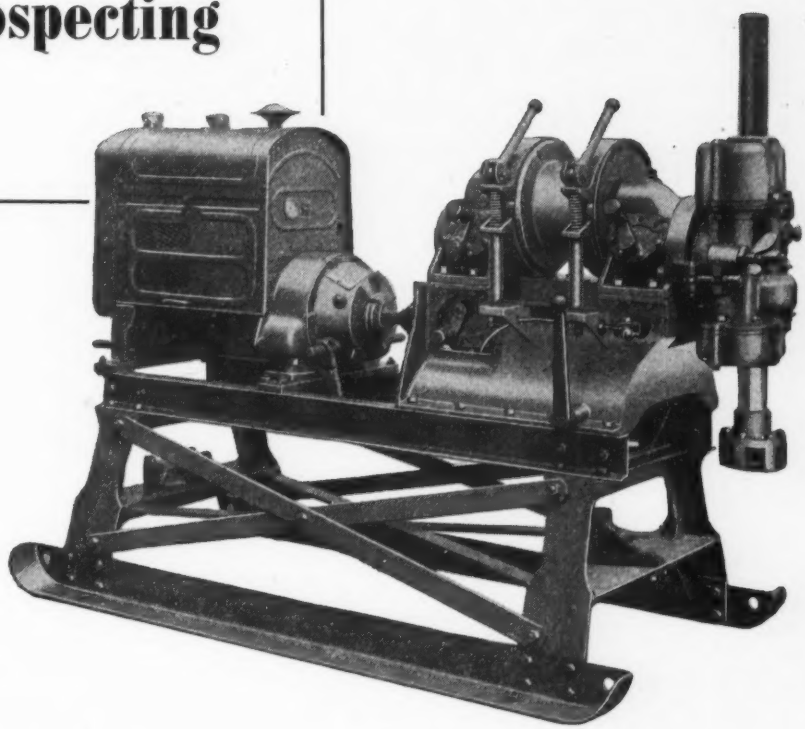
Send for new booklet: "Better Stone Crushing"

American PULVERIZER COMPANY

*Originators and Manufacturers of Ring Crushers and Pulverizers*

1245 Macklind Ave.
St Louis 10, Mo.

# for Test Borings and Mineral Prospecting



# CP Gasoline-Driven Diamond Core Drill

Specifically designed for drilling and standpiping jobs where the "going is tough," the ruggedly built CP No. 8 gasoline driven DIAMOND CORE DRILL has a capacity of 900 feet with E-EX Fittings.

It meets every requirement for making test borings, for mineral prospecting from the surface, and for shallow oil structure drilling in all formations.

Skid-mounted, on a substantial steel frame, the drill is readily moved from hole to hole under its own power.

When drilling at the continuous high speeds made possible by bortz bits, it gives maximum performance with low maintenance.

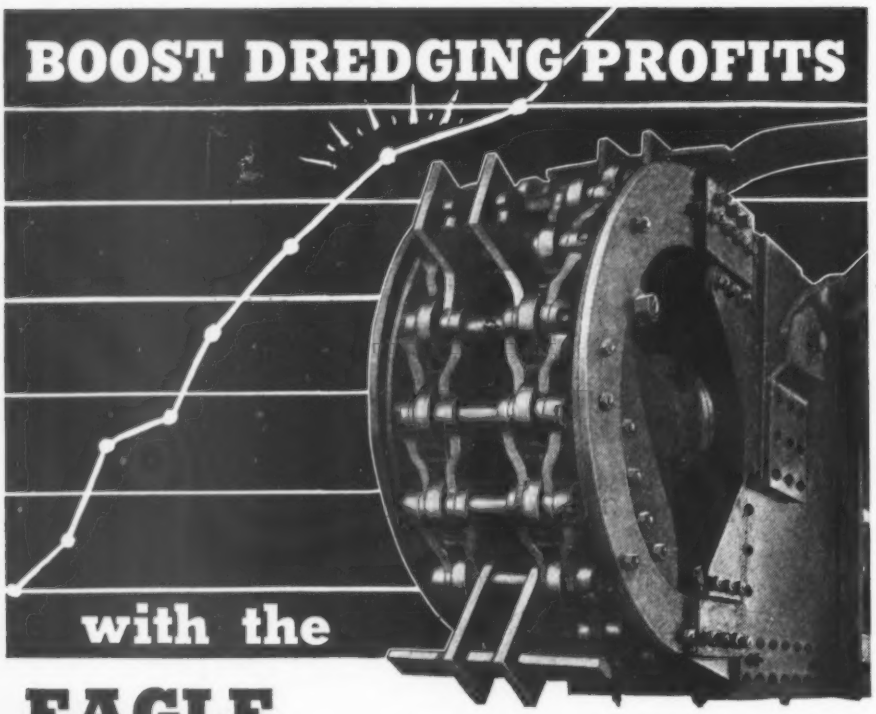
*Write for complete specifications.*

**CHICAGO PNEUMATIC TOOL COMPANY**

General Offices: 6 East 44th Street, New York 17, N. Y.

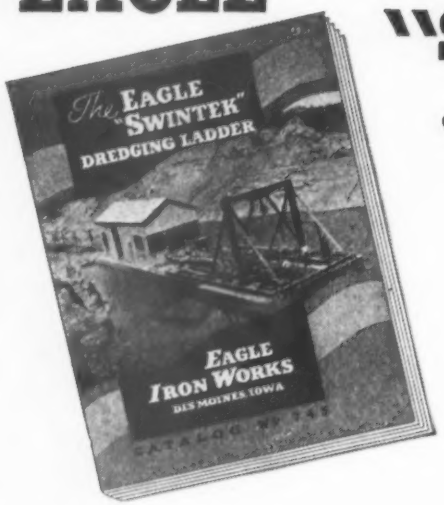
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# BOOST DREDGING PROFITS



with the

# EAGLE "SWINTEK"




- **Cutters Assure Uniform Feeding . . . loosen and agitate deposit**
- **Chain Prevents Clogging . . . keeps oversize material out of nozzle; carries large chunks clear of suction area**

Dredge deeper . . . dredge more —the Eagle "Swintek" Dredging Ladder assures regular flow of solids for the maximum number of working hours. Digging chain loosens, agitates compacted solids; screens out oversize pieces—no more "slug" pumping; no more shutdowns to clean out obstructions in nozzle opening or pipeline. Get at those usually coarser, deeper deposits—"Swintek" permits dredging below clay strata or boulder nests impeding plain suction pumping. Rugged, properly engineered design assures long service life, minimum maintenance. Digging chain of AMSCO austenitic manganese steel, "the toughest steel known," for maximum impact and abrasion resistance. Send for Bulletin 745 above.

**EAGLE IRON WORKS**
**137 Holcomb Ave., Des Moines, Ia.**

**EAGLE** *Specialized Sand and Gravel Equipment*
"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS
CLASSIFIERS — REVOLVING SCREENS
**EAGLE IRON WORKS**
DES MOINES, IOWA
"SERVING INDUSTRY FOR OVER SEVENTY YEARS"


## Canadian Meeting

*(Continued from page 110)*

strides in the application of aluminum therapy, the application consisting of breathing in of a controlled quantity of finely powdered aluminum dust by miners before they go into the pits as a protection against contraction of silicosis. It has been in use for three years in Canada and 73 mines have fitted change houses for application of the therapy. There are indications of excellent results and, thus far, the inhalation of the dust (hydrated aluminum oxide) has not been shown to have detrimental effect on the human body.

The particles of the harmful dusts below one micron size are the dangerous range, so the aluminum powder is available in the same size range. McIntyre research powder is 99 per cent minus 5 microns and 90 per cent minus one micron. It is specified in the license arrangement that the therapy be used only for residual dust and that dust control and ventilation practices must continue to be practiced according to acceptable plant practice. The therapy is considered a preventative and not a treatment. The real tests will be revealed on men treated from the start of their work in mines where there is exposure to harmful dusts. Application in tight chambers is affected by compressor.

## Operating Session Discusses Feeders-Primary Crushers

*(Continued from page 82)*

ALEX T. CECIL, Jeffrey Manufacturing Co., in his comments on the installation of feeders for primary crushers, said that a number of 4- x 10-ft. and 5- x 12-ft. feeders have been installed. The size of rock handled governs the size of feeder. He mentioned feeders fitted with automatic amplitude control and said that, in hammer mill installations, the feeder can be controlled in direct proportion with the mill.

The length of the feeder is important according to another commentator (we didn't get his name). If of insufficient length the overrun into the crusher will nullify the benefits. In his opinion end dump is preferred to minimize bridging action in the feeder hopper.

In reply to a question as to actual results obtained by the use of feeders with primary crushers, it was said there was an increase in production of 30 per cent in New England quarries, sometimes as high as 50 per cent. The uniform flow of stone throughout the plant is the important consideration. The percentage increase in production possible evidently is larger with the bigger crushers. Ted Cooke reported a 20 per cent increase due mainly to the elimination of jams in the crusher. His feeder is mounted at a 45 deg. angle to the axis of the jaw crusher, which is

*(Continued on page 113)*

## Operating Session

*(Continued from page 112)*

helpful in aligning the stone pieces on their long axes.

W. B. BOBBITT, Radford Limestone Co., Inc., Radford, Va., said one advantage of crusher feeders is that the surge loads on the plant are eliminated. The question was asked if there was any advantage to installing a grizzly or screen between the crusher and feeder. WAYNE KING, The W. S. Tyler Co., said that his company did not prefer to use bigger openings than 10 in. square in an installation and said that screens are being installed for the purpose in foreign countries. He raised the opinion that it was always important to take the fines out of any crusher feed material.

Other commentators believed it more important (particularly now) to scalp out fines ahead of secondary crushers because they are being pushed hard to get out more fine sizes of stone. Nelson Severinghaus said that if fines sell at a cheaper price than coarse aggregate, it would be a profitable scalp. Another producer said that in some cases fines have proved necessary in order to get nipping in the crusher. IRVING COX of Allis-Chalmers said that scalping was needed between the primary and secondary crushers for the removal of dirty stone.

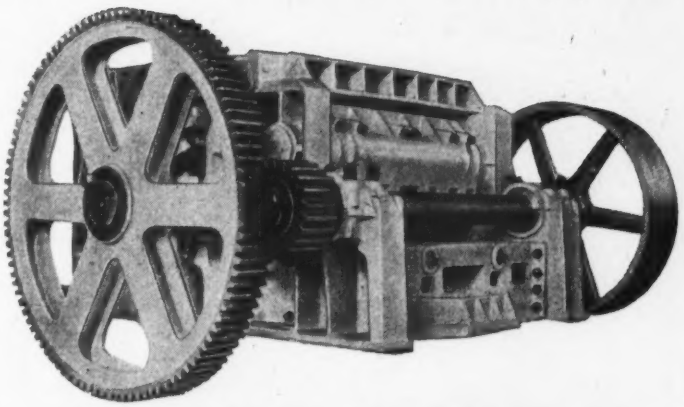
Experience with plastic and other types of jaw crusher bearings was discussed. Luther Burriss, The Weston and Brooker Co., Columbia, S. C., reported that plastic bearings had proved superior to any other swinging jaw bearings he had tried. After many months' service, the clearances were less probably due to growth, he said. In slow-moving equipment such as the swing jaw bearing, the plastic bearing is self-lubricating. On high speed equipment, with heat involved, they apparently are unsatisfactory.

C. H. ROBERTS, Traylor Engineering and Manufacturing Co., said that the advantage of curved jaw plates is that the crusher can crush to finer size at the same setting, and will have greater capacity and longer plate life. The disadvantage is that there would be a reduction in the feed opening amounting to 42- x 60-in., for example, for a 48- x 60-in. jaw crusher.

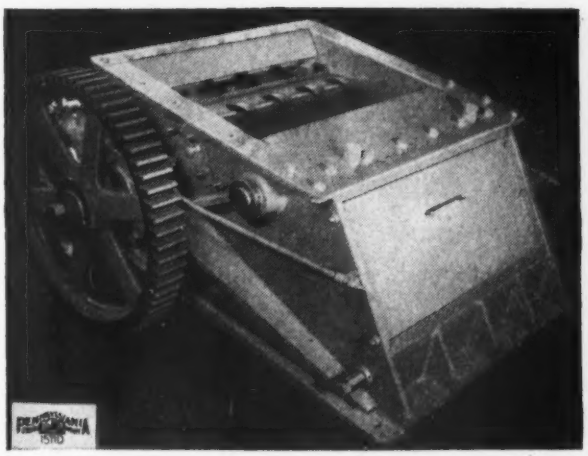
WILSON P. FOSS, JR., New York Trap Rock Corp., suggested that the industry might give consideration to occasionally moving the primary crusher close to the face through a portable arrangement.

Hard surfacing has been used with variable success according to participants in a discussion of their experiences. Nelson Severinghaus told of his long experience with Ni-hard (nickel) chute linings. It was suggested that the use of too hard surface material for a given application will result in spalling rather than failure through wear. Ted Cooke said that hard surfacing he had tried on drop balls would drop off.


# "PENNSYLVANIA"



PENN-LEHIGH

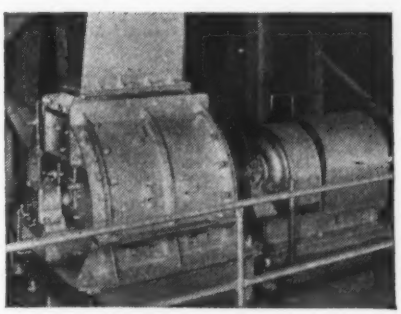


ARMORWELD

**Massively STEELBUILT, PENN-LEHIGH and ARMORWELD Series Primary and Secondary Single Rolls, assure low cost, non-clog crushing of Cement-making Materials, Limestone, Gypsum and Industrial Minerals, dry or wet.**

**Twelve (12) sizes meet the requirements of large, medium and small plants.**

**Automatic Tramp Iron Protection.—Adjustability for sizing and wear compensation.**



REVER-SIBLE

**IMPACTORS**

**make secondary and finer reductions by repeated smashing impact, against imperforate anvils, without cage attrition, to granular products from materials listed above.**

**Alternate right and left-hand operation sharply cuts maintenance cost.**

REVER-SIBLE

**HAMMERMILLS**

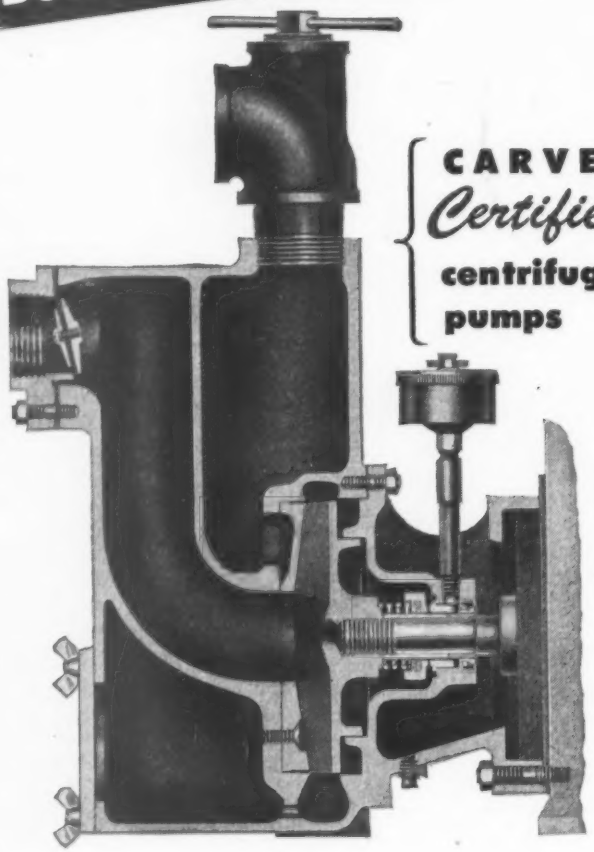
**prepare Primary Crusher products to required specifications with high efficiency and low maintenance cost. Specialized for fine reductions of Cement-making Materials, Agstone and Gypsum Rock, in open or closed circuit.**

**OUR ENGINEERS ARE** PENNSYLVANIA CRUSHER COMPANY **AT YOUR SERVICE**

1706 Liberty Trust Bldg., Philadelphia 7, Pennsylvania
New York, Pittsburgh, Chicago, Los Angeles, Birmingham
Associated with Fraser & Chalmers Engineering Works, London

**STEELBUILT CRUSHERS**

# Here's the Inside Story of Better Pumping Performance



CARVER *Certified* centrifugal pumps

★ High Capacity at high suction lift.

★ High Efficiency at high pressures and at slow speeds.

★ Non-Recirculating—no priming gadgets.

★ Life-Time Seal — wearing surfaces are almost diamond-hard.

★ Fewer Working Parts because of simple design.

★ Non-Clogging — streamlined design.

★ Performance of each pump is *certified.*

Capacities from 3000 to 200,000 GPH. Sizes 1½" to 10". Ask for Bulletin 101-A. Carver Pump Co., Muscatine, Iowa.

**CARVER PUMPS** Muscatine Iowa


## Delayed Action Blasting

*(Continued from page 85)*

ference between instantaneous and delayed action blasting with court plaster stuck on a board. A considerable force was required to pull off the plaster with a harness attached to simulate an instantaneous blasting action, but with the harness to the plaster at one end it peeled off easily, representing the delayed action blasting effect.)

This is a very simple demonstration but it clearly shows with corn plasters, what can be done in shooting stone by the delayed action method. After firing a few shots with the new delayed action switch, we could see the stone was broken much better than it had been in previous shots fired by the instantaneous method and with the exception of end breakage, few stones were found to be oversize. Naturally we were greatly pleased with this result and as more shots were fired it was positively proved that the stone was being broken much better, and we were relieved of a considerable amount of secondary drilling.

After a number of shots had been fired by the delayed action method we were convinced that the vibrations had been reduced to such an extent that they were almost negligible, so we immediately began to concentrate our efforts on better breakage of the stone. The apparent reason for better breakage when shots are fired by the delayed action method, is that after the first hole fires, the energy of the explosives in the following holes is directed at the stone already in motion and, since it is under tension and already broken away from the bank, almost the full force of the energy expelled goes in the mass of moving stone, since this is the line of least resistance. This in turn causes a grinding action which can easily be seen as the stone is tumbling down and being broken in smaller pieces.

We believe that our results have been extremely successful and while we have only used this method during the past year it has been definitely proved that we are getting much better breakage. We expect to continue our studies during the coming season and hope to accomplish even more along this line.

One of the last shots we have fired was ten holes in a dolomite quarry which ordinarily requires much secondary drilling. That shot is practically cleaned up now and with the exception of about a dozen large ones which came down at the ends, not a stone has been found which required drilling. The bottom is out "good" and little drilling will be needed there before the next shot is fired. (Illustrations of results obtained by delayed action blasting, showed one in dolomite and one in trap rock. Both are ten-hole shots. It will be noticed how well the stone is broken and how uniform the top of the pile lays. While

the illustration does not show how far away from the bank the stone lays, there is a good sized valley between the face and more than half way down the pile.)

Mr. Miller brought along one of the switches he developed and by the use of electric lights showed the difference between instantaneous and delayed action firing. While a switch is used in this demonstration, the basic principle is similar when other methods are used. Twenty lights represented twenty holes. When all the lights are connected together, as in an instantaneous shot, when power is applied they all light simultaneously. This is exactly what happens in a shot connected in this manner, except in that case all the holes fire at one time. Now by re-connecting them to the delayed action switch and inserting it in the circuit, instead of all the lights coming on at one time, they start at hole number one and each follows in turn lighting twenty thousandths of a second after the previous one.

Following Mr. Miller's paper, Dr. L. Don Leet, Seismologist, Harvard, Mass., discussed "Vibration Tests of Delayed Action Blasting." He explained how the crests and troughs in vibrations apparently cancel each other out, in short-time delay blasting. Seismograph records were shown to illustrate how vibrations have been reduced in actual blasts, when larger numbers of blast holes are shot through delayed action as compared to smaller numbers blasted through conventional instantaneous methods.

His theory of short-time delay blasting is that a wedge action is obtained, the No. 3 charge working into partly broken stone, thus not exerting pressure on solid rock.

In commenting on Mr. Miller's paper, John Jeffries, Atlas Powder Co., said that flexibility in the timing of shots by a blasting device would be desirable.

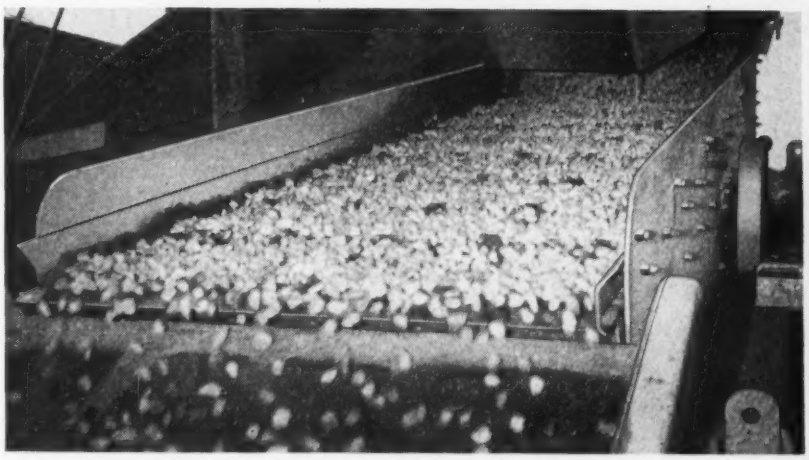
## Manufacturers Luncheon

*(Continued from page 79)*

J. B. TERBELL of the American Manganese Steel division, American Brake Shoe Co., and chairman of the Manufacturers' Division, presided at the general luncheon, Wednesday, January 29. He introduced Russell Rarey of Marble Cliff Quarries Co., who responded for the officers and directors of the National Crushed Stone Association. Mr. Rarey read a resolution of the Board thanking the manufacturers for contributing some $3000 to compensate for revenue formerly obtained from the exhibit.

Mr. Terbell then introduced Geo. Romney, general manager, Automobile Manufacturers Association, the speaker. His address on "Management-Union Cooperation" gave much food for thought. He said that two assumptions must be recognized. First that the American people are against excessive power in any one group, and second, the American people want

Long Life . . .



Sure, it's a SECO
VIBRATING SCREEN

• Not only a long life, but an active one! That's the success story of Seco vibrating screens on all types of installations all over the country. Some have been on the job nearly ten years. Many have been given especially gruelling assignments meeting extra production requirements of the war just ended. Our files are filled with enthusiastic reports from operators who find that Seco's patented equalizer assembly pays off in more tons per hour . . . with less wear and tear on moving parts. The Seco pictured above has been in constant service for B. V. Hedrick, Lilesville, North Carolina, for eight years. Put a SECO to work on your job.

Write for "A Guide to Better Screening." Dept. B

TRUE CIRCULAR MOTION VIBRATING SCREENS

SECO

SCREEN EQUIPMENT COMPANY, INC.
9 Lafayette Avenue, Buffalo 13, New York
In Canada: United Steel Corp., Ltd., Toronto

STEER
WITHOUT STOPPING

with
OSGOOD
Air Control

Smooth, effortless steering—without stopping the forward motion of the machine—with the cab in any position—that's OSGOOD Air-Controlled Steering! Independent air cylinders, actuated by a small lever in the cab, disengage and set steering brakes on the driving sprockets instantly, eliminating the need to hunt for a point where a steering lock can be engaged.

OSGOOD Air Control means faster, safer operation . . more work done in less time, with less effort. Plan now to choose an OSGOOD . . a complete line of power shovels, draglines, cranes, clamshells, backhoes and pile drivers . . a model for every type of work.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO. EXCAVATOR
MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

PULVERIZERS

Hundreds of Installations . .
Use Bradley Pulverizers

for the reduction of

AGRICULTURAL LIMESTONE
Cement Materials and all
Dry, Non-Metallic Minerals

CAPACITIES: 1 TO 50 TONS PER HOUR
FINENESSES: 20 TO 350 MESH

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.


to correct these abuses through the ballot. He said there is a current belief among many people that the American people must become poor to regain its virtue.

Mr. Romney said that government and union policies had reduced productivity of labor, and the only way to whip confusion was to produce more. He said that the English and Russian governments had come to this conclusion. Citing the automotive industry in this country, Mr. Romney said that labor productivity had declined 25 per cent. He did not advocate repeal of labor laws as a solution of the problem, and said that trial and error methods must be tried. Centralized monopolistic labor unions, he said, are vastly more powerful than competitive industry.

## Long Kiln Operation

*(Continued from page 73)*

between 1300-1400 deg. F., while in the long kiln the temperatures vary between 900-1000 deg. F., depending on the capacity at which the kiln is operated.

The draft is controlled from the burner's platform, by either opening or closing a motor driven slide damper. The proper draft required is determined from the $CO_2$ and CO readings of the automatic gas analyzer.

Kiln speed is regulated through rheostat control at the burner's station. Secondary air flow through the clinker cooler bed is regulated automatically. Normally the clinker bed is held to 4½ in. depth on the cooler grate.

Responsibility for adjustment of feed according to kiln changes, through vacuum and filter speed changes, is invested in the filter operator. These changes are done manually in accordance with the level needed in the filter tanks as determined by the ferris wheel feeders tied synchronously with kiln speed. A telephone system between the kiln firing floor and filter floor is provided in event of emergencies such as breaks in the filter cloth which, through excessive dilution, might result in surges through kiln.

Principal difficulty is encountered with high ash coals. A change from a normal 7 or 8 per cent ash coal to one, say, of 14 per cent, introduces an additional 6 or 7 lb. of flux per 100 lb. of coal, tending to cause back rings approximately 60 ft. from the front of the kiln. Rings also have a tendency to build at the nose ring.

The foregoing is based upon existing operating conditions, but research to attain optimum performance continues. Kiln speed likely will be increased in the near future on the theory that a thinner bed of material flow will have greater exposure to the luminous radiant heat and therefore effect a more uniform burn.

Type I, II and II A.S.T.M. portland cements are manufactured at this mill. John M. Pomeroy is plant manager and James G. Thompson is chief chemist.

## FINANCIAL

RECENT DIVIDENDS

| | | |
|---|---|---|
| Alpha Portland Cement Co. | $0.25 | Mar. 10 |
| Gypsum, Lime & Alabastine, Canada, Ltd. | .20 | Mar. 1 |
| Gypsum, Lime & Alabastine, Canada, Ltd. | .20 | June 1 |
| Gypsum, Lime & Alabastine, Canada, Ltd. | .20 | Sept. 1 |
| Gypsum, Lime & Alabastine, Canada, Ltd. | .20 | Dec. 1 |

NORTH AMERICAN CEMENT CORPORATION, New York, N. Y., is working out a plan for settlement of arrears on its income mortgage 6½s of 1953 in view of the better outlook for the construction industry. No interest has been paid on them since issuance in 1933 pursuant to a reorganization plan.

•

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, has called the remaining 2751 shares of 6 per cent preferred stock on January 1 at 102, leaving only common stock as its capital obligation.

•

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Penn., reported net income of $270,082 for 1946 which compares with a net income of $6626 in 1945.

•

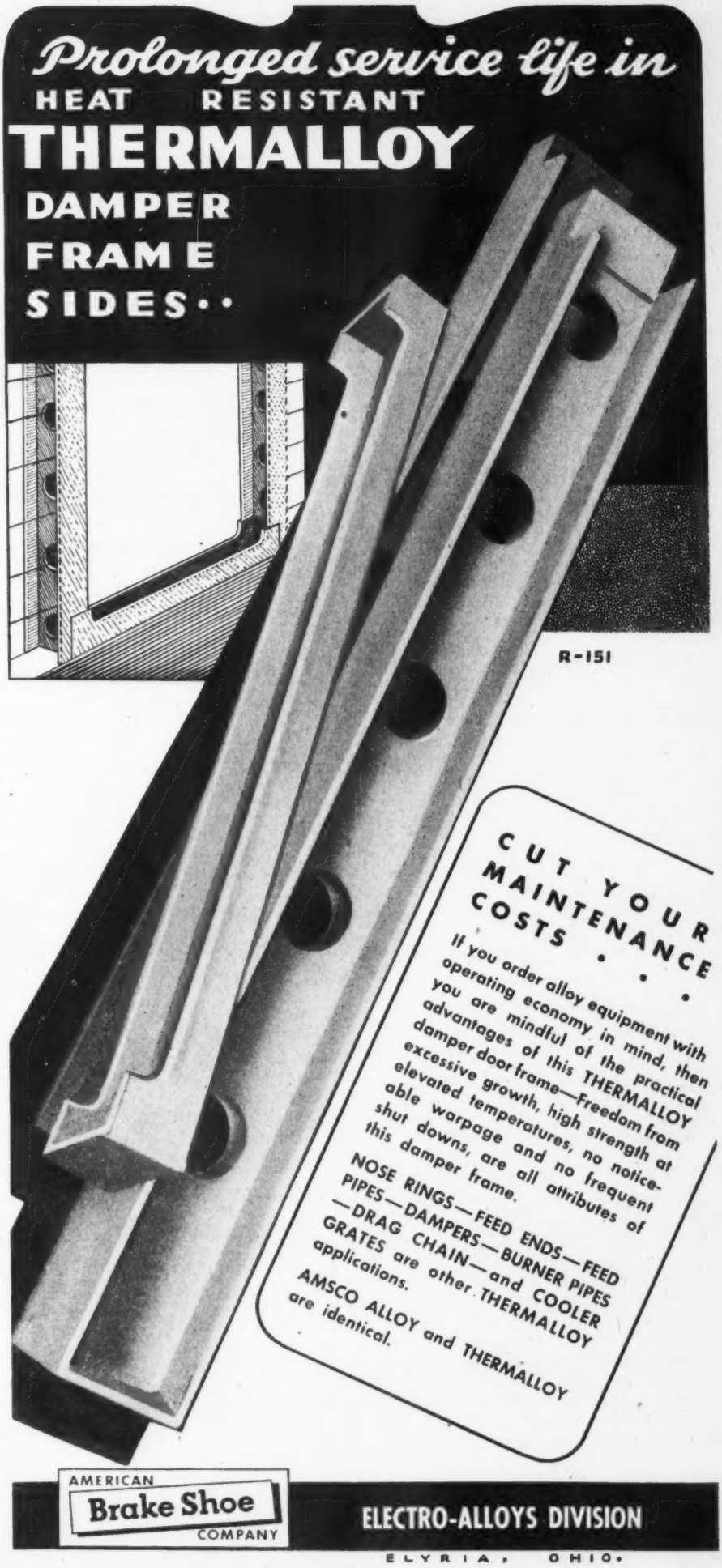
COLONIAL SAND & STONE CO., New York, N. Y., has filed with SEC an amendment to its registration statement relating to sale of 250,000 shares of common. An underwriting group consisting of Emanuel, Deetjen & Co., and Allen & Co., plans to offer stock to the public at $5 a share. Of shares to be offered, 125,000 shares will be sold for the account of Geroso Pope, president of the company. Net proceeds of $500,000 will be used to retire bank loans and for the purchase of new equipment.

•

PENNSYLVANIA-DIXIE CEMENT CORPORATION, New York, N. Y., has taken steps to strengthen its capital structure. A net working capital of $2,910,000 was shown in the September 30, 1946, balance sheet as compared with $2,825,000 at the end of 1945, and the funded debt was reduced in this period $400,000, or 14 per cent, leaving a balance of $2,450,000, which the management hopes to retire in 1947. This would leave the company with common stock of 525,693 shares outstanding on which a profit for 1946 of around $2 a share would be realized, according to a New York report.

•

UNITED STATES GYPSUM CO., Chicago, Ill., has filed a registration statement with the SEC covering 399,477 shares of $20 par value common stock. Present common stockholders would get rights to buy at $60 one of the new shares for each three held. The rights were offered to holders of record January 4, and expired January 31. C. H. Shaver, secretary and treasurer of the company, said that net earnings of the company for the



Prolonged service life in
HEAT RESISTANT
THERMALLOY
DAMPER
FRAME
SIDES••
R-151
CUT YOUR MAINTENANCE COSTS • • •
If you order alloy equipment with operating economy in mind, then you are mindful of the practical advantages of this THERMALLOY damper door frame—Freedom from excessive growth, high strength at elevated temperatures, no noticeable warpage and no frequent shut downs, are all attributes of this damper frame.
NOSE RINGS—FEED ENDS—FEED PIPES—DAMPERS—BURNER PIPES —DRAG CHAIN—and COOLER GRATES are other THERMALLOY applications.
AMSCO ALLOY and THERMALLOY are identical.
AMERICAN
Brake Shoe
COMPANY
ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO.

year ended December 31, 1946, are estimated at not less than 49.75 per share of common or a net income of approximately $12,239,500. Net income for 1945 was $4,352,183. Proceeds of the new issue of stock will be used to help finance a contemplated $42,000,000 program of new construction and plant imporvement which has been given in detail in ROCK PRODUCTS.

•

CORONET PHOSPHATE CO., Baltimore, Md., had a net income of $366,899 for the year ended December 31, 1946, as against $159,381 for calendar year 1945.

•

NORTHWESTERN STATES PORTLAND CEMENT CO., Mason City, Iowa, reported a net income of $621,572 for the year ended November 30, 1946. This compares with a net income of $338,604 for the year ended November 30, 1945.

•

HERCULES CEMENT CORPORATION, Philadelphia, Penn., showed a net loss of $74,003 for the year ended December 31, 1946, as compared with a loss of $168,790 for the year ended December 31, 1945.

•

INTERNATIONAL MINERALS & CHEMICAL CORPORATION, Chicago, Ill., had a net profit of $1,206,105 for the six months ended December 31, 1946. This compares with a net profit of $391,417 for the six months ended December 31, 1945. Net sales for the last half of 1946 were $14,958,482 as against $11,277,423 for the corresponding period in 1945.

•

CANADA CEMENT CO., LTD., Montreal, Canada, showed a net profit of $2,178,523 for the year ended November 30, 1946, as against a profit of $1,080,146 for the year ended November 30, 1945.

•

DIAMOND PORTLAND CEMENT CO., Middlebranch, Ohio, has filed notice with the SEC of intent to publicly offer 24,000 one dollar par common shares at $12.50 per share through Merrill, Turben & Co., Cleveland, Ohio. Proceeds are to be used to finance a general rehabilitation and expansion program.

•

THE WARNER CO., Philadelphia, Penn., has reported a net income of close to one million dollars for 1946, compared with $551,207 for 1945. Sales in 1946 exceeded $10,500,000, a record. This compared with $7,301,600 in 1945 and $10,313,935 in 1942, the previous high. Demand for sand, gravel and lime products has been very high. A two-year modernization and improvement program involving $1,800,000, launched in 1945, has been expanded into a three-year program costing about $2,500,000. New barges and ready mixed concrete trucks are included in this broadened program. The "central mixed" concrete business now accounts for about 40 per cent of the company's business.


FULL LOADS

in any kind of digging

in less than two bucket lengths

That's the kind of performance that makes money —and it's the kind that you get when your dragline is equipped with a Page Automatic dragline bucket.

Page Automatics dig right in at the first pull on the load line because they always land in digging position and hold it even with all lines slack. Instant penetration at any depth, 20 feet — 100 feet — or more, assures faster loading. Perfect balance of the bucket helps the digging action. Teeth cannot be lifted off the ground by the pull line. For details, send today for Bulletin 43-B.

New Page Reversible Center Shank Tooth Points secured by a hook bolt will stay absolutely tight.

PAGE Automatic

DRAGLINE BUCKETS and WALKING DRAGLINES

PAGE ENGINEERING CO.
CHICAGO 38, ILLINOIS

Join ROCK PRODUCTS family

of over 13,000 Readers

Every issue of ROCK PRODUCTS brings you news of your industry, suggested solutions to your problems, marketing ideas and scores of other valuable features.
*$3 two years, $2 one year*

ROCK PRODUCTS
309 W. JACKSON BLVD.,
CHICAGO 6, ILL.

LONE STAR CEMENT CORPORATION, New York, N. Y., reported a net income of $5,232,384 for the year ended December 31, 1946, as compared with $2,774,138 for the year ended December 31, 1945. Sales in 1946 totalled $39,849,669 as against $31,092,952 in 1945.

•

COLONIAL SAND & STONE CO., INC., New York, N. Y., showed a net profit of $474,398 for the eleven months ended November 30, 1946, which compares with a profit of $127,740 for the year ended December 31, 1945. Net sales for 11 months in 1946 were $5,910,487 as compared with $3,999,859 for the year ended December 31, 1945.

•

MARBLEHEAD LIME CO., Chicago, Ill., reported a net profit of $93,827 for the eleven months ended November 30, 1946. Net sales during this period were $1,963,203.

•

GIANT PORTLAND CEMENT CO., Philadelphia, Penn., had a net income of $178,679 for the year ended December 31, 1946, which compares with $28,759 for the year ended December 31, 1945. Net sales in 1946 were $2,305,750 as against sales of $1,222,020 in 1945.

•

BASIC REFRACTORIES, INC., Cleveland Ohio, recently made a private loan of $1,500,000, maturing at the rate of $25,000 quarterly over a 15-year period at an average interest rate of 3½ per cent. Proceeds from the loan were used in part to purchase for $600,000 a former government-owned dolomite refractories plant operated by the company during the war, and the remaining proceeds will be applied to improvement of this plant at a cost of $700,000. The plant will double the company's capacity.

•

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reported a net income of $300,507 for the first nine months of 1946 as compared with $119,089 for a like period in 1945. Sales for the first nine months of 1946 were $5,117,916 as against $4,284,420 for the same period in 1945.

•

## 1947 Cement Production

CIVILIAN PRODUCTION ADMINISTRATION has estimated 1946 cement production at 161,000,000 bbls., against estimated total requirements of 162,000,000 bbls., including 15,000,000 for the supply "pipeline." Production in 1947 will be approximately 190,000,000 bbls., against a requirement of 173,000,000 bbls. plus any "pipeline" needs carried over.

## Organize Agstone Producers

W. R. CLARK, Plattsburg, Mo., has been perfecting a state-wide organization of agricultural limestone producers. A meeting was recently held at Sedalia, Mo., to outline its program and to perfect the organization.


RECOMMENDED *by its Reputation on Jobs Involving Super-Severe Service...*

GOODALL "SSS" CONVEYOR BELTING

**An exceptionally strong, durable belt, made especially to cut replacement costs on your longest, heaviest conveying jobs. Used for handling ores; run-o-mine and screened coal; crushed limestone up to 8"; rough slag; and similar materials, wet or dry.**

**Specifications for cover thickness, number of plies, weight, etc., determined by specific operational requirements. Can be supplied endless and in step-ply constructions if desired.**

*Contact Our Nearest Branch for Details and Prices*

GOODALL RUBBER CO., INC.

THE GOODALL-WHITEHEAD COMPANIES

Philadelphia • Trenton • New York • Chicago • Pittsburgh • Boston • Los Angeles
San Francisco • Seattle • Salt Lake City • Houston • Factory: Trenton, N. J. • Est. 1870

WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION

UNIVERSAL VIBRATING SCREENS *give best results*

Guaranteed to give you best results on your most difficult separations. UNIVERSALS are of rugged yet simple construction, lowest in first cost and in maintenance. UNIVERSALS have been tried and proved in 28 years of dependable service.

Write for 32-page catalog on screens and screening.

Type "MR" 42"x96" Double Deck

★ ★ ★ UNIVERSAL VIBRATING SCREEN CO. ★ ★ ★
RACINE - - WISCONSIN

# MACWHYTE WIRE ROPE

*is correct for Rock Product operations*

**Use MONARCH Whyte Strand Internally Lubricated, PREformed Wire Rope... YOUR BEST BUY!**

When you use the correct wire rope, both the rope and your equipment last longer, cost less to operate. Macwhyte engineers and distributors are at your service to give you the correct wire rope for your equipment.

A useful wire rope handbook and buyers' guide will be sent to you on request. Ask your Macwhyte distributor or write Macwhyte Company for Catalog G-15.

NO. 903

**MACWHYTE WIRE ROPE**

Manufactured by Macwhyte Company
2949 Fourteenth Ave., Kenosha, Wis.

Mill Depots: New York · Pittsburgh · Chicago
Minneapolis · Fort Worth · Portland · Seattle · San Francisco
Los Angeles · Distributors throughout the U. S. A. and other countries



# SLASH COSTS
## *with* Sauerman Machines

**ECONOMICAL STOCKPILING**

Picture shows how one-man Sauerman Scraper System handling a 25,000-ton stockpile of phosphate rock at Florida drying plant. Operation is changed quickly from storing to reclaiming.

**DEEP PIT DIGGING**

This Sauerman Slackline Cableway is moving gravel from a wet pit 90 ft. deep, delivering direct to screens at cost of only few cents a cubic yard.

THREE main economies are assured by using Sauerman Scraper or Cableway Machines for long haul work such as moving sand and gravel out of pits or ponds, stripping, stockpiling, bank excavation, etc. These economies are:

(1) Digging, hauling and automatic dumping are merged into a continuous, rapid operation controlled by one operator.

(2) Power requirement is moderate.

(3) Maintenance is simple.

Sauerman machines offer handling capacities from 10 to 1,000 tons per hour and operating spans from 200 to 1500 ft. Specifications of the various sizes and types of machines, together with illustrations of their uses are given in the Sauerman catalogs. Write for this literature today.

**SAUERMAN BROS., INC.**
**530 S. Clinton St., Chicago 7, Ill.**


## Manufacturers' News

**H. K. Porter Co., Inc.**, Pittsburgh, Penn., has elected Colonel C. de Freest Larner as a director of the company. Clarence R. Abitz has been appointed general manager of the McKees Rocks Works of the American-Fort Pitt Spring Division, and Roland E. Nelson has been named manager of the Chicago office, succeeding George L. Green.

**Marion Power Shovel Co.**, Marion, Ohio, has appointed M. V. Cornell as sales manager. He succeeds Walter N. Westland who recently resigned to join the sales organization of Cummins Engine Co., Inc. Mr. Cornell has been associated with the company since 1938, in charge of sales in eastern Ohio and western New York State. As sales manager, he heads a sales organization made up of company representatives, district offices and distributors throughout this country and in a number of foreign countries. He is a native of Mt. Vernon, Ohio, and a graduate of Ohio State University with a B.S. degree in business administration.

M. V. Cornell

**Joseph T. Ryerson & Son, Inc.**, Chicago, Ill., has appointed C. D. D'Amica as manager of the Special Steels Department at the Los Angeles, Calif., plant. He will be in charge of sales of alloy and stainless steels. E. F. Wood, formerly in charge of the Denver office, has been assigned as manager of the Work Order Department at the steel-service plant, and Albert J. Bauer has been appointed sales representative in the Rocky Mountain States, with headquarters in Denver, Colo.

**Euclid Road Machinery Co.**, Cleveland, Ohio, has promoted W. W. Paape, district representative in the Chicago territory, to the position of domestic sales manager, with headquarters in Cleveland. A graduate of the University of Illinois, Mr. Paape has been active in the construction industry for over 20 years. Prior to his Euclid connection he was sales manager of the Syracuse Supply Co. and before that time served as representative for Caterpillar Tractor Co. and LaPlant-Choate Mfg. Co.

W. W. Paape

**Cummins Engine Co., Inc.**, Columbus, Ind., has announced by appointment of V. E. McMullen as executive

vice-president, and R. E. Huthsteiner as vice-president and general manager. Leonard W. Beck has been named general sales manager, and Waldo M. Harrison, controller.

**Union Wire Rope Corp.**, Kansas City, Mo., has appointed Walter Voightlander as technical director, and Charles M. Zerr as chief engineer. For 43 years Mr. Voightlander has been actively engaged in technical and research work in the wire rope industry. Even before he received his degree in mechanical engineering from Stevens Institute of Technology, he worked in the chemical laboratory of the John A. Roebling Co. He left this position in 1922 to become chief engineer of the American Chain & Cable Co. where he remained until 1927 when he became chief engineer of the Union Wire Rope Corp. Mr. Zerr, also a graduate of Stevens Institute, has been Mr. Voightlander's assistant for the past 12 years. Other advancements in the technical service include Raymond O. Kasten as assistant technical director; Robert C. Downey, research chemical engineer; Omer Brenton, assistant metallurgist, and Dwain L. Bedford, metallurgist in charge of the chemical, physical and metallurgical functions of the laboratory.

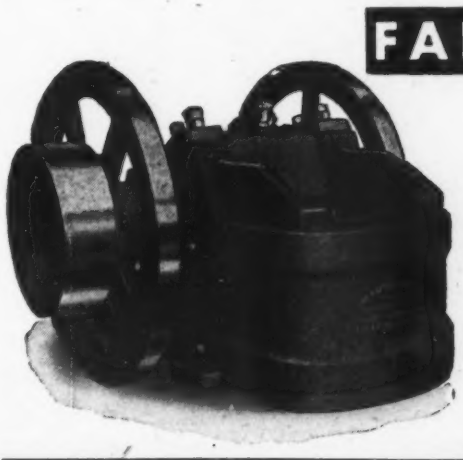
Walter Voightlander

Charles M. Zerr

**Pioneer Engineering Works, Inc.**, Minneapolis, Minn., has announced the appointment of W. A. Rundquist as sales promotion manager in charge of advertising, sales promotion and sales training. Graduated in 1929 from North Dakota State College with a degree of B.S. in Mechanical Engineering, Mr. Rundquist was associated with Bell Telephone Laboratories, New York, N. Y., for seven years, and later was with Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., as supervisor of technical information. During the war he served as Post Engineer with the Corps of Engineers and later as Production Liaison Officer for the Upper Mississippi Valley Division, then was assigned to the Office of Chief of En-

W. A. Rundquist

SEVEN STAR DENVER SERVICE
ORE TESTING
COMPLETE EQUIPMENT
MILL LAYOUT
FIELD ENGINEERING
WORLDWIDE SERVICE
GENUINE FACTORY REPLACEMENT PARTS
DECO TREFOIL
"The firm that makes its friends happier, healthier, and wealthier"
STANDARD RELIABLE 24 HOUR SERVICE EFFICIENT
DENVER EQUIPMENT COMPANY
P.O. BOX 5268 • DENVER 17, COLORADO
DENVER 17, COLORADO · P.O. Box 5268 · TORONTO, ONTARIO, 45 Richmond Street W. · LONDON, EC2, ENGLAND Salisbury House
NEW YORK CITY 1, N.Y. · 4114 Empire State Bldg · VANCOUVER, B.C. · 305 Credit Foncier Bldg · JOHANNESBURG, S. AFRICA 8 Village Road
CHICAGO 1 · 1123 Bell Bldg · 307 N. Michigan · MEXICO, D.F. · Edificio Pedro de Gante, Gante 7 · RICHMOND, AUSTRALIA 530 Victoria Street



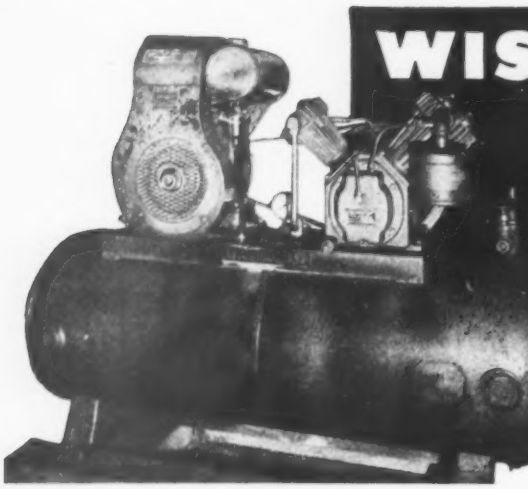
FARREL-BACON

CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service

FARREL-BACON
ANSONIA, CONN.



# WISCONSIN
## HEAVY-DUTY *Air-Cooled* ENGINE
HELPS TO SUPPLY AIR FOR C&O RY. BLUE RIDGE TUNNEL JOB!

This single cylinder heavy-duty Wisconsin Air-Cooled Engine is operating a H-42-DG, Type 30 Ingersoll-Rand Air Compressor which furnishes starting air for the XVO Compressor Unit on the C & O Railroad's Blue Ridge Tunnel Job, near Afton, Virginia . . . handled by contractors Bates & Rogers, Chicago.

This is just another run-of-the-mill Wisconsin Air-Cooled Engine construction service application . . . typical of the many heavy-duty power jobs entrusted to these tough, hard-hitting engines on a great variety of equipment in many fields. Wisconsin Air-Cooled Engines are supplied in 4-cycle single cylinder and 4-cylinder V-type models in a power range of 2 to 30 hp.

Specify "WISCONSIN" for utmost dependability and heavy-duty serviceability.

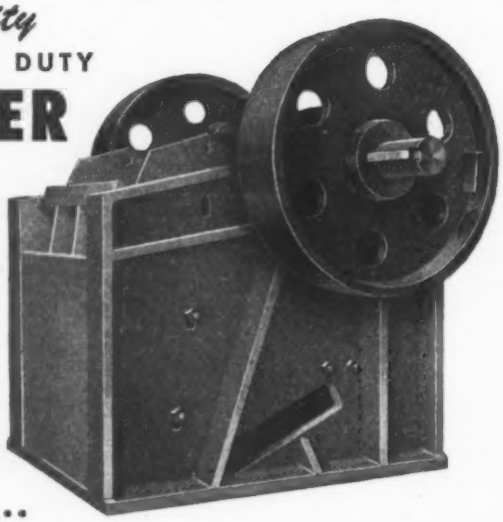
**WISCONSIN MOTOR Corporation**
MILWAUKEE 14, WISCONSIN
*World's Largest Builders of Heavy Duty Air-Cooled Engines*

---

**GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 61 YEARS**

*For Greater Capacity*
OUR IMPROVED HEAVY DUTY
# JAW CRUSHER
*"Right for the*
**HARDEST ROCK"**

Operators of Crushing Plants on location of harder rock deposits, asked Gruendler Engineers for a Sturdier Jaw Crusher better able to withstand the terrific strain on the toughest jobs, and still increase their ton per hour output



**...Here it is...**

*"A Better Crusher to do a Better Job"*

*Manufacturers of* PRIMARY AND SECONDARY HAMMERMILLS FOR LIMESTONE DISTRICTS

WRITE FOR ILLUSTRATED BULLETIN B R 5, No. 2
GRUENDLER IS DELIVERING

# GRUENDLER
CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI


gineers as Administrative Officer, Critical Components Section.

**B. F. Goodrich Co.**, Akron, Ohio, has appointed Warren H. Hackett and E. A. Doerschuk as assistant treasurers. H. V. Gaertner, formerly assistant treasurer, has been made controller, succeeding T. B. Tomkinson who has retired after more than 43 years of service.

**Lima Locomotive Works, Inc.**, Shovel and Crane Division, Lima, Ohio, announces the appointment of Interstate Equipment Co., Statesville, N. C., as sales agent for Lima shovels, cranes and draglines in the State of North Carolina. K. C. Eller is owner of the company.

**Sauerman Bros., Inc., Chicago, Ill.**, announces the appointment of Martin Meyer as assistant sales manager.

**Hewitt Rubber Division of Hewitt-Robins, Inc.**, Buffalo, N. Y., has appointed Robert D. Bernhard to supervise sales of industrial hose and belting in southern Indiana and Louisville, Ky., which was formerly served from the St. Louis office by A. S. Purmort, who now will concentrate his work in the Missouri and southern Illinois territory.

**Koehring Co.**, Milwaukee, Wis., announces that J. A. "Jack" Miller has joined the sales staff and will work with distributors in the North Central states. He was formerly general sales manager of the Rosholt Equipment Co., Minneapolis, Minn.

**Worthington Pump & Machinery Corp.**, Holyoke, Mass., announces that E. J. Schwanhausser, vice-president, has been reelected president of the Diesel Engine Manufacturers Association. Also reelected as vice-presidents were J. E. Peterson, vice-president of General Machinery Corp., and Gordon Lefebvre, president of Cooper-Bessemer Corp. Robert H. Morse, Jr., vice-president and general sales manager of Fairbanks, Morse & Co., was again chosen to serve as treasurer.

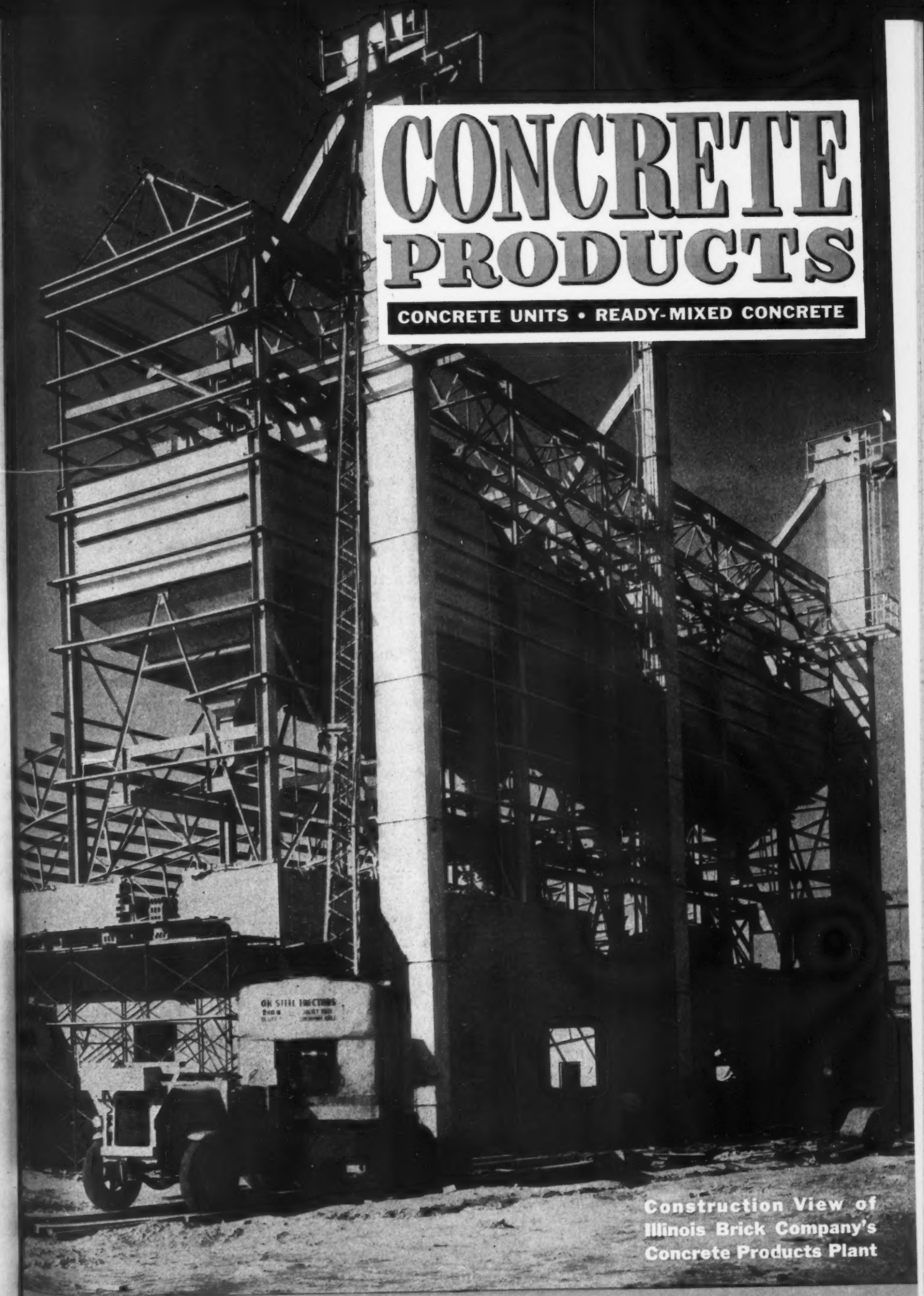
**Link-Belt Speeder Corp.**, Chicago, Ill., announces that Hayes Parsons has been made assistant to the president, with headquarters at the Cedar Rapids, Iowa, plant.

**General Electric Co.**, Schenectady, N. Y., has established an affiliated manufacturing companies department, and appointed Vice-President L. R. Boulware as general manager. E. J. Harrington has been made manufacturing manager of the new department, and Roy W. Johnson, marketing manager. The manufacturing affiliates include Carboloy Co., Inc., General Electric X-Ray Corp., Hotpoint, Inc., Locke Insulator Corp., The Monowatt Electric Corp., Telechron Inc., and the Trumbull Electric Mfg. Co.

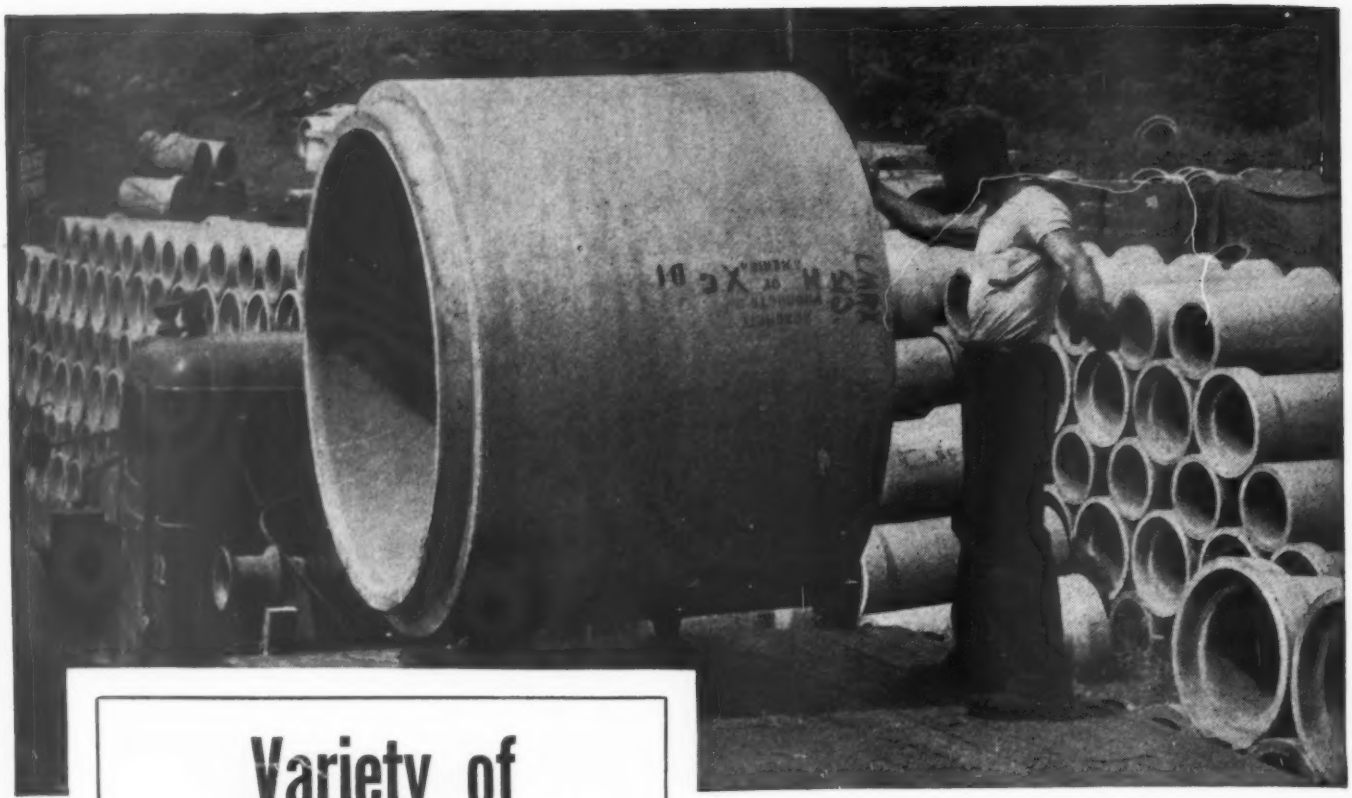
**New Holland Mfg. Co.**, Mountville, Penn., announces that the Lancaster Engineering Corp. has moved its plant and offices to Lancaster, Penn., but the industrial equipment is still manufactured at Mountville, Penn., operating under the name of the New Holland Manufacturing Co.

# CONCRETE PRODUCTS

CONCRETE UNITS • READY-MIXED CONCRETE



Construction View of Illinois Brick Company's Concrete Products Plant



**CONCRETE PIPE** made with Duraplastic at Neville Island, Pittsburgh, Pa., plant of the Concrete Products Company of America.

# Variety of Concrete Products

made with

## ATLAS DURAPLASTIC

AIR-ENTRAINING PORTLAND CEMENT

**Experience** of hundreds of manufacturers shows that Duraplastic cement makes superior concrete products without additional expense or unusual changes in manufacturing methods. This applies to block, brick, pipe, drain tile, silo staves and other concrete products.

On concrete pipe, for example, manufacturers find that Duraplastic cement imparts a more rubbery consistency to the green product. This facilitates handling and results in less cracking and less breakage of the green pipe. Surface appearance is improved.

Duraplastic cement complies with ASTM and Federal specifications and sells at the same price as regular cement.

**Send for further information.** Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N.Y.

**OFFICES:** Albany, Birmingham, Boston, Chicago, Cleveland, Dayton, Des Moines, Duluth, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.

CP-D-45

## ATLAS DURAPLASTIC

TRADE MARK REG. U. A. C. CO.

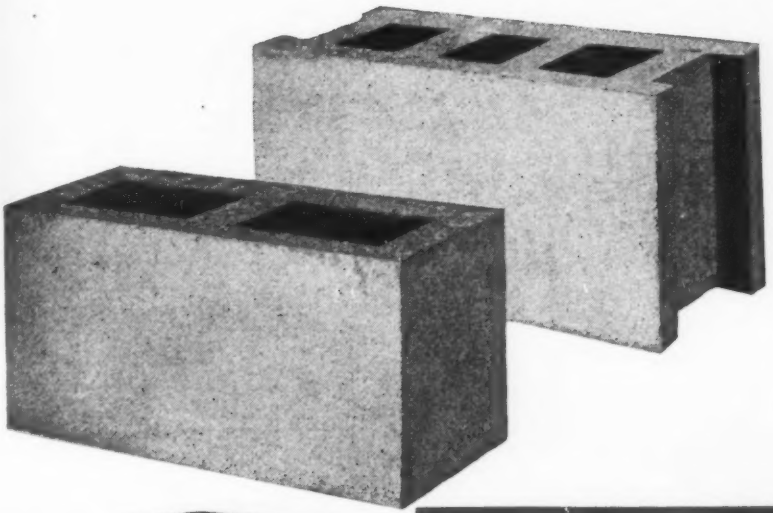
AIR-ENTRAINING PORTLAND CEMENT

MAKES SUPERIOR CONCRETE PRODUCTS AT NO EXTRA COST

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel—Sunday Evenings—ABC Network*

# . . . Dense, Water Repellent . . .

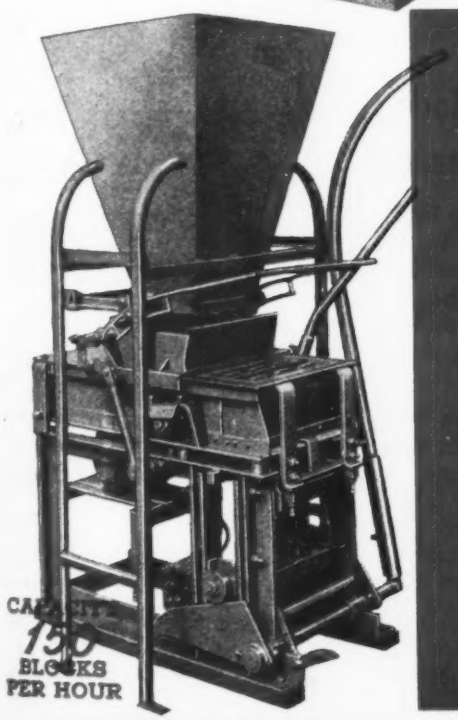
## Concrete Units Built on the GEORGE SUPER-V BLOCK MACHINE are Highest Quality True-Dimensional



George SUPER VIBRATION, a high frequency shaking of the block mold, quickly settles the aggregate to form a closely-packed masonry unit. PRESS-PAC, an exclusive George feature, presses the aggregate firmly and evenly throughout the block—not just on the top or bottom. The combined action of PRESS-PAC and SUPER VIBRATION makes a sturdy, dense, water-repellent block.

The two-unit George Super-V block machine, designed for moderate-to-large scale plants, turns out 1,800 to 2,000 tough units in an average eight hour day's run.

CAPACITY 300 BLOCKS PER HOUR



CAPACITY 150 BLOCKS PER HOUR

The single unit George machine, becoming increasingly popular as the "Little George," produces 1,000 to 1,200 block units per average eight hour day.

George manufactures a full line of equipment for complete block plants—George Super-V machines, conveyors, mixers, and various types of two and three cell pallets. Call, write, wire or visit our plant for further information about how a George setup produces sturdier masonry units faster.

GEORGE SUPER V

TRADE MARK

# F. C. George Machine Co.

100 S. WESTMORELAND DRIVE

ORLANDO FLORIDA

# SMITH-MOBILE

## CONTINUES TO LEAD THE PARADE!

NO WATER PIPES OR NOZZLE INSIDE DRUM

GRAVITY FLOW FEED CHUTE CHARGING

DIRECT CONNECTED MOTOR WITH 3 POINT SUSPENSION

CONTROLLED SLOW OR FAST DISCHARGE

PERFECTED DRUM CLOSING DOOR AND SEAL

HIGH DISCHARGE

### Improved, Time-tested Models with Even Greater Refinements!

Smith's acknowledged leadership in the concrete mixer field now looms bigger than ever. This time it's a super streamlined Smith-Mobile . . . truly the last word in mechanical design and superb workmanship . . . just the truck mixer you've been waiting for.

These improved models retain the well-known Smith-Mobile advantages of High Discharge . . . Feed Chute Charging . . . Visible Mixing, etc. They have larger drums with increased capacities, plus a long list of refinements that make for even greater speed, efficiency and safety in operation.

4 sizes . . . truck mixer or agitator . . . with deliveries stepped up as fast as conditions permit. Write today for new Smith-Mobile bulletin just off the press.

**THE T. L. SMITH COMPANY**
2885 N. 32nd ST. • MILWAUKEE 10, WIS., U. S. A.

LOWER WEIGHT BIGGER PAY LOADS

NO LEAKY LOADING HATCHES

COLD WEATHER PROTECTION

LARGER DRUMS

END TO END MIXING ACTION

VISIBLE MIXING

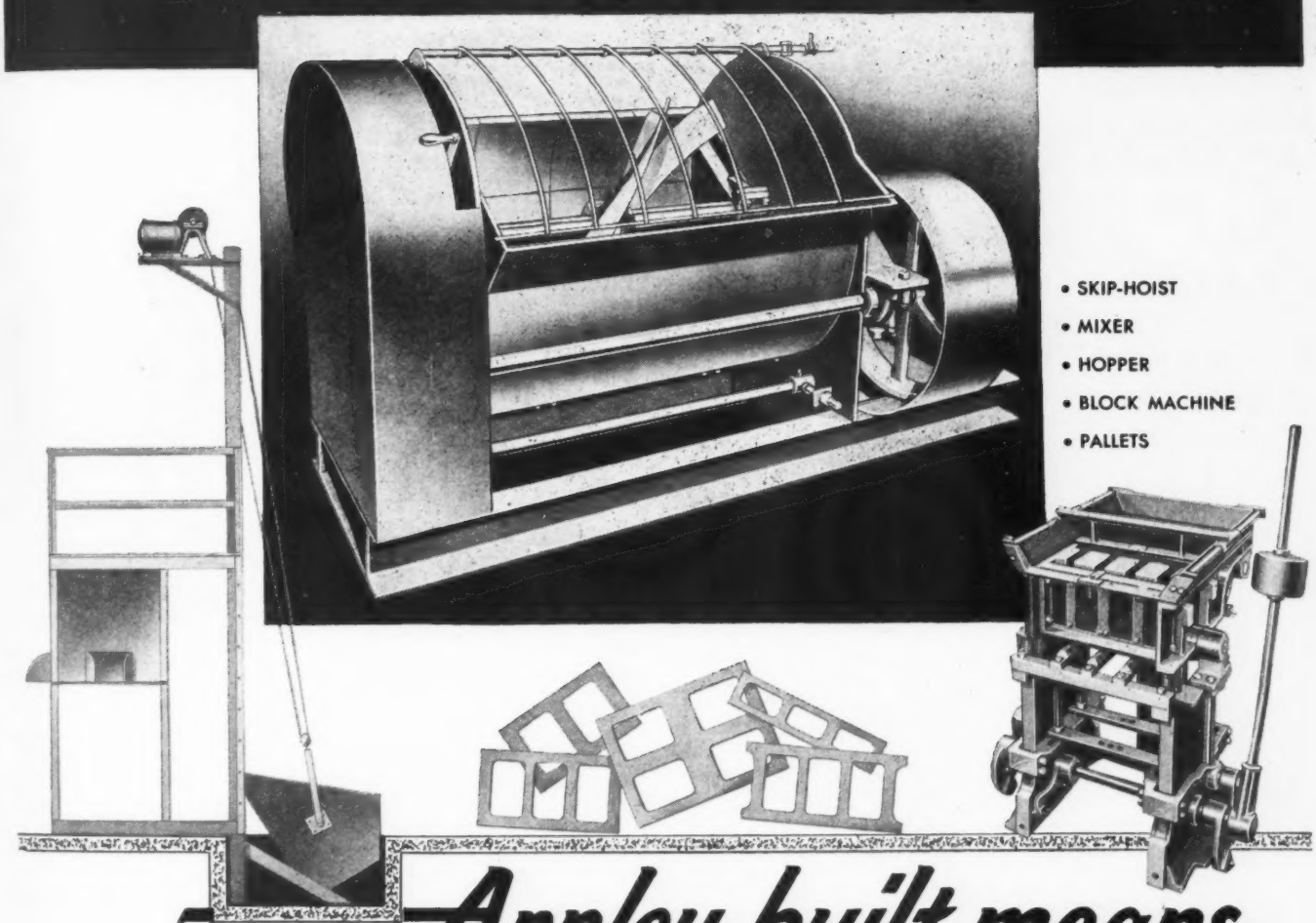
DUAL WATER SYSTEM

SMITH

**CONCRETE MIXER MANUFACTURERS SINCE 1900**

A 5130-1P

# SPEAKING OF MIXERS..



- SKIP-HOIST
- MIXER
- HOPPER
- BLOCK MACHINE
- PALLETS

## *Appley built means* PRECISION BUILT!

Fast discharge and mixing time of Appley's rotary blade mixer are specially planned for the *all* Appley concrete block production line.

The stationary drum is lined with tough interchangeable chrome alloy castings. Manganese steel mixing blades, adjustable for wear, may be removed without disturbing the main shaft. For smooth, dependable performance, jack and main shafts rotate in self-aligning roller thrust bearings. Cast steel bull gear has machined teeth.

All Appley machines are assembled from precision-machined, heavy duty parts. Any worn part may be easily replaced.

**--for profits--build quality block APPLEY *all the way***

## J. W. APPLEY & SON

INCORPORATED

829-831 NINTH STREET, NORTH

ST. PETERSBURG 4, FLORIDA

"LITTLE GIANT"

*A Tribute to*

# AQUELLA

from a prominent California Architect

1373 SOUTH EL MOLINO AVENUE
PASADENA 5, CALIF

November 15, '46

Prima Products, Inc.
230 Fifth Avenue,
New York City.

Gentlemen:

I have been a practicing architect in Pasadena for something like forty years and have thought that you might care to have from me an endorsement of Aquella. I was the architect of the Pasadena Community Playhouse, the Huntington Art Gallery at San Marino, California, and some of the buildings of the California Institute of Technology.

My own home in Pasadena was built some 35 years ago. When the forms for the concrete of its basement walls were removed a number of fissures were disclosed which, during heavy rain storms resulted in the basement being flooded. This has happened virtually every year now since the house was built.

I knew that if I could get at the outside of the basement walls it would be a simple matter to apply waterproofing and stop the leaks. But that would be difficult and expensive. This year I thought I would experiment with Aquella on the inside of the walls. We have just had the worst rainstorm of the season. The rain came down in torrents for several days. But our application of Aquella to the inside of the walls stopped the leaks. Our basement is as dry as a bone. I am therefore glad to recommend Aquella as an unusually effective waterproofing compound.

Yours truly,

Elmer Grey

**The principle on which Aquella works and how it is being used by architects, engineers and contractors to control water seepage on all porous masonry surfaces is told in our new brochure "Aquella and Concrete Masonry Construction." May we send you a copy?**

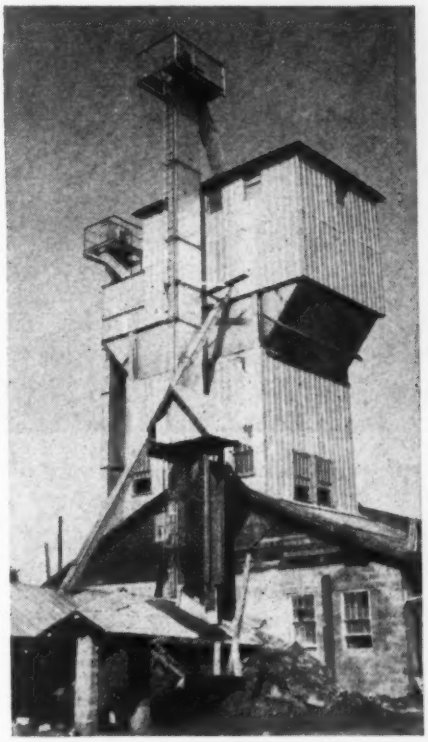
**PRIMA PRODUCTS, Inc.**

DEPT. C-8 • 10 EAST 40TH STREET, NEW YORK 16, N. Y.

# PLANT LAYOUT
## For Economical Operation

### Hoke Concrete Works, Raeford, N. C., designs new plant with long tunnel belt conveyor to haul cinders into the plant

By H. E. SWANSON



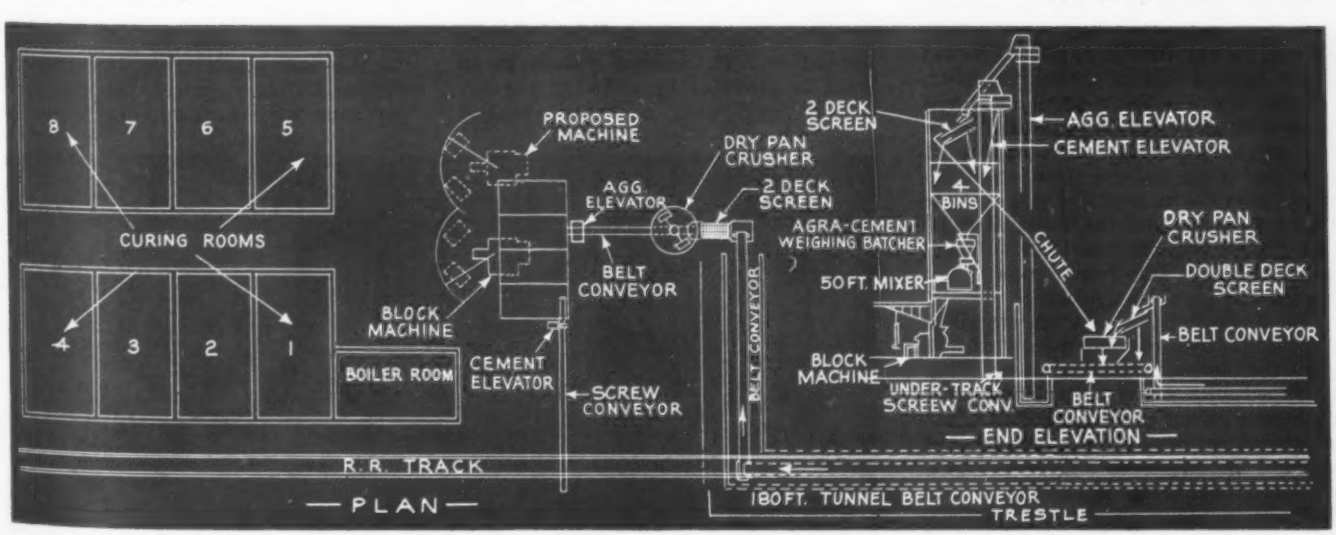
Aggregates are stored in a four-compartment bin at top of plant. Above bins is screen to size cinders, oversize returning to crusher house by enclosed chute. Weigh batcher is located directly under four-compartment bin to measure aggregates and cement

CAREFUL PLANNING and the experience of many years in the production of concrete masonry units have resulted in the efficient, modern and compact plant of the Hoke Concrete Works, Raeford, N. C., placed in operation in August, 1946.

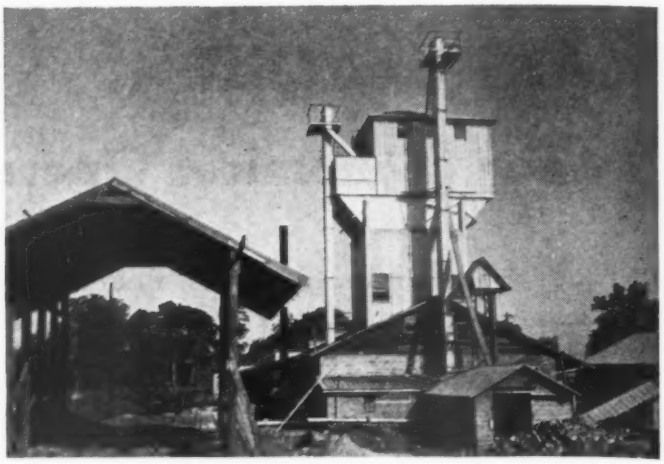
Interesting features of this plant include: raw cinder storage under a trestle, transportation of aggregates from storage to plant by belt conveyors through a recovery tunnel, screening and crushing equipment for cinders, and gravity flow from bins to weigh batcher, mixer, and block machine. It was designed to utilize all available space in locating equipment for the most economical operation. Long an advocate of quality block, the company makes every attempt to produce a better unit through selective grading, accurate proportioning, and thorough steam curing. Accelerated steam curing is provided through a combination of live steam and unit heaters that produce a temperature of 200-deg. during the 24-hour curing period.

As can be seen from the accompanying illustrations and sketch, a railroad trestle parallels the entire length of the plant. At the rear of the building, the bins were constructed for storage of aggregates. Above the bins is the final cinder-sizing screen, and the weigh batcher and mixer are located below the bins. Immediately below, on the ground floor, is the block machine. To the rear of the bins is the cinder processing equipment where the raw cinders are ground and screened prior to elevation to the screens above the bin. In front of the block machine is the working area for the lift truck, spacious enough to permit free movement in the plant. Directly in front of the machine and some 30-ft. from it is the areaway that leads to the curing rooms, four being located on each side. Plant design is compact to provide a smooth flow from beginning to end with a minimum of lost motion.

Cinder and slag aggregates delivered to the plant by rail hopper cars are discharged to the outside storage area under the 180-ft. trestle. The area is divided into four compartments by wooden walls, and under the stockpiles is a concrete recovery tunnel, 180-ft. long, 6-ft. wide, and 6-ft. high. A number of overhead openings in the tunnel, equipped with clam-shell type, manually-operated discharge gates, feed to an 18-in. Continental Gin Co. tunnel belt conveyor. This belt discharges at a transfer station to a second 18-in. belt conveyor, placed at right angles to the reclaiming belt, which conveys material to the crushing and primary screening building. Tramp iron is removed at the discharge end of this conveyor by a Dings magnetic pulley, the foreign material dropping to a chute immedi-




Plant layout for minimum handling of materials and finished block from bins to yard storage



Left: Storage area under trestle is above a recovery tunnel. Cinders and slag are delivered to plant for processing by belt conveyors. Right: Looking toward plant from housing over trestle

ately below the pulley for discharge to a waste pile.

## Cinder Processing

Cinders conveyed to the plant from the reclaiming tunnel, discharge from the belt to a double-deck screen. When slag is conveyed, it by-passes the cinder processing equipment, and is transferred directly to a belt conveyor that feeds a bucket elevator for delivery to bins. Cinders discharging from the belt are sized on a 4 x 8 ft. double-deck Cedarapids horizontal vibrating screen equipped with 1- and ½-in. sq. openings on the upper and lower decks, respectively. The plus ½-in. product, retained on both decks, is reduced in a 9-ft. Riddell dry pan crusher while the minus ½-in. cinders are conveyed by an 18-in. belt conveyor to the bucket elevator. The upper deck of the screen is used to take part of the load from the lower deck, thus eliminating much of the wear that it would get should the entire load be handled by one deck.

Cinders crushed in the dry pan discharge to the belt conveyor feeding the bucket elevator, the belt conveyor also being equipped with a Dings magnetic pulley to catch any tramp iron not caught at the first pulley as well as any foreign material picked up in transit. Cinders, elevated 84-ft. to the top of the plant, discharge to a vibrating screen identical with the primary screen. This screen is equipped with ½- and ¼-in. sq. openings, plus ½-in. returning by chute to the dry pan, and the material passing the two decks goes to two compartments of the four-compartment Butler bin as sized cinders.

Sand and bulk cement are stored in the other two compartments of the bin, the cement compartment being equipped with a bell-ringing indicator to denote when the bin is full. Conventional screw conveyor and bucket elevator installations deliver the bulk cement from railroad cars to the bin. To provide additional storage capacity for cement, a silo will be constructed adjacent to the plant in the near future. When slag units are produced, the compartments containing cinders are drained prior to the delivery of the slag aggregates and the same two compartments are used for this aggregate.

Immediately below the bin is a weigh batcher equipped with a four-beam scale. The batcher discharges by gravity to a 50-cu. ft. Besser mixer where water is added to the aggregates and cement. To prevent cement from sticking to the batcher hopper, a Syntron vibrator attached to one side helps to send the entire batch into the mixer. Water added to the batch is measured by a 150-g.p.m. meter placed in the line. The mixer discharges to the hopper of a Besser Super-Vibrapac also by gravity.

## Accelerated Curing

Block from the machine, loaded on 72-block capacity steel racks, are moved to curing rooms by a Clark 6000-lb. fork-type lift truck. This truck also transfers cured units from the rooms to outside storage.

Each of the eight curing rooms has a capacity of 1060 standard units. Steam is introduced through two 1-in. pipe at floor level in each room, each pipe having 1/16-in. perforations spaced at 5-ft. centers. Steam at 30 p.s.i. is provided by a 60-hp. tubular boiler, fired with a 200-lb. Anchor stoker. At the rear and top of each room is a unit heater that supplies dry heat to supplement the steam and assists in maintaining a temperature of 200-deg. throughout the curing period. A 24-in., 1150 r.p.m. fan keeps the warm, humid air circulating, changing the air every 1½-min., to keep a constant temperature at all points in the room. Each room is also equipped with an American dial thermometer, placed on the outside of the room, and connected to the inside by an 8-ft. tube.

Floors in the rooms were constructed to slope ¼-in. per foot to the rear allowing the condensate to drain to a trough and thence into a sump where it is picked up by a small pump and returned to the boiler. Doors are tightly sealed to prevent escape of heat and steam. The doors slide vertically in grooves, and are equipped with gaskets to assure a tight closure. After a 24-hour curing period, the units are removed and placed in outside storage.

## Sell Products Through Dealers

About 75 per cent of the total production of 7000 units per 10-hour day is handled through dealers. A zone map has been made up with Raeford as the hub, each zone 10 miles in width. Delivery prices increase ½¢ per zone with a minimum charge of

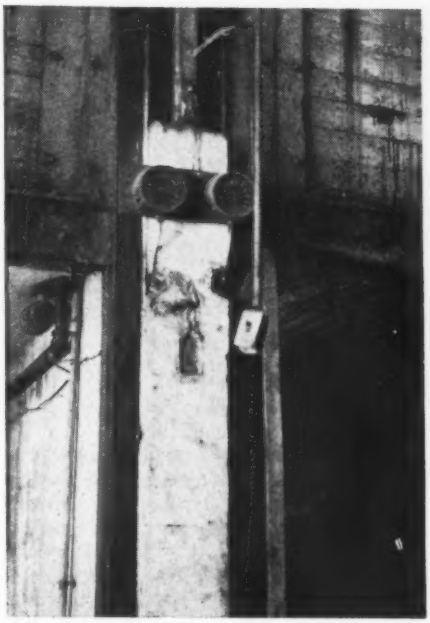
L. M. Upchurch, president and general manager, to the left, and A. Howard, assistant manager

1½¢ in the home zone. At present, this company operates with about 25 dealers within a 60-mile radius. Illustrated herewith is a sample price list used by the Hoke Concrete Works and sent to dealers. Three zone prices are listed, with the center column containing the price for the zone in which the dealer operates. Prices for the two adjacent zones are also listed, to acquaint the dealer with the prices for those neighboring zones and to assist him in establishing his retail price.

Dealers receive a five per cent discount plus five per cent for cash. The delivery charge is paid to the truckers. A profitable business has been established through dealer trade, and a healthy merchandising program is carried out by distribution of literature to dealers and others. Located in the heart of a good agricultural section, the farm market has been promoted not only by personal contact but also by the distribution of such literature as the Cinder Concrete Products Industry News, Concrete Masonry Pictorial, and the Portland Cement Association publications. These papers are also sent to architects and contractors. In addition, this company will provide the Portland Cement Association motion picture film to civic organizations, schools, and other organizations.

Recent completion of the Upchurch high school in Raeford offers an example of the possibilities of cinder block. The school, consisting of 22 rooms, was constructed with 4-, 8-, and 12-in. units produced here.

The new plant was also constructed of concrete units produced at the older plant. Galvanized metal is used in the superstructure containing the bin and batching equipment. The plant was designed for a second block machine which will be added in the near future, together with another Clark lift truck and yard hoist to assist in yard storage.



Each curing room is equipped with dial thermometer located outs.de room. Tube from dial enters room for a distance of 8 ft.

L. M. Upchurch, president of the newly-formed North Carolina Concrete Masonry Association, is president and general manager of Hoke Concrete Works. A. Howard is assistant manager, and J. W. McPhaul is assistant secretary and treasurer.

## Big Stave Business

THE MARIETTA CONCRETE CORPORATION, Marietta, Ohio, reported sales exceeding one million dollars in 1946. The construction of a $250,000 plant in Baltimore, Md., is also being planned. During the past year a new plant was built at Marietta for the production of concrete silo staves and concrete block.

Price list sheet which is keyed to zone map on opposite page of folder

## A Thousand Blocks In 30 Man-Hours

AN INTERESTING STUDY has been made by the Bureau of Labor Statistics, Department of Labor, Washington, D. C., which developed that production of 1000 concrete block in 1946 required an average of 30 man-hours at the plant.

The 50 concrete block plants surveyed were producing at a monthly rate of 8.6 million lightweight and heavyweight concrete block of 8- x 8- x 16-in. equivalent size. At this level, a month's output would require 262,000 man-hours. In general, five more man-hours per thousand block were required to produce lightweight block than heavyweight block.

Plants producing over 350,000 block manufactured three times as many block per man-hour as those producing less than 50,000 block monthly. The greatest variation in man-hour requirements between these plants appeared in the manufacturing process, as compared to the other operations (yard, overhead, and administrative). In addition to the level of operations, the number of block machines operated by the plants had an important effect on man-hour requirements; those plants having three or more block machines were able to cut man-hours well below the average.

In addition to the man-hours at the concrete products plants, information and estimates were obtained on labor requirements for extraction of raw materials and fuel used, hauling of these to the plant, and transportation of the finished block to its point of use at construction jobs. It was found that these secondary operations, together with manufacture, required a total of about 69 man-hours for a thousand block, delivered and ready for use.

## Concrete "Lumber"

CEMENSTONE CO., Pittsburgh, Penn., is expanding its plant to produce what has been called "concrete lumber." This material is a lightweight, reinforced concrete made up into planks, studs, and columns. This company has been producing precast concrete structural members for many years, but the market has been principally for commercial and industrial construction.

## Buy Block Concern

C. J. WILKERSON, owner of the Concrete Products Co., Tucson, Ariz., has purchased the Brown and Browne Building Products Co., Irving, Texas, a suburb of Dallas. Steam curing rooms are being built by the new owner.

# Anticipate Large Volume In 1947

## Attendance at exposition and convention of National Concrete Masonry Association breaks all records. Practical program draws wide interest

ALL RECORDS for attendance were shattered by a wide margin with 3000 registrants at the 27th annual convention of the National Concrete Masonry Association held February 17-20 at the Sherman hotel in Chicago. The previous high was approximately 1000, at the 1946 meeting.

This almost sensational participation by the industry reflected a record-breaking volume of sales in 1946, almost universal optimism for an equal volume of business in the year ahead, and an intense interest in machinery displayed at the first postwar Concrete Industries Exposition. Manufacturers who exhibited machinery and equipment were kept mighty busy demonstrating new developments to an enthusiastic audience that was definitely in a buying mood. The convention was well organized, especially from the point of view of the exhibitor, sessions being confined to the morning each day. As a result, the exposition was packed each afternoon and early evening.

Another innovation in the program was that no group luncheons or banquets were scheduled, which afforded opportunity for small groups to get together to discuss matters of mutual interest and to sign orders for those new machines. Informal social get-togethers between delegates from the far corners of the country, as well as from foreign lands, are an effective means for interchange of ideas which can be as valuable to industry members, as the convention sessions themselves. The arrangements committee is to be congratulated for outlining such a program and yet providing, in general sessions, for thorough consideration of technical and production problems, merchandising, labor relations and other matters of immediate concern to the industry.

Action was taken by the Board of Directors to hold the next Concrete Industries Exposition in 1949 and to continue on an alternate year basis thereafter. In the intervening years the annual convention will be rotated between various cities, beginning with New York City in 1948.

### Officers

HENRY E. BUCHHOLZ, Illinois Brick Co., Franklin Park, Ill., secretary-treasurer for 1946, was elected president of the National Concrete Masonry Association, succeeding DEANE R. LYNDE, Cinder Concrete Products, Inc., Denver, Colo., who automatically becomes chairman of the Board of Directors, as provided for in the by-laws which also limits the term of presidency to one year.

PAUL E. BOHM, Concrete Products Corp., South Bend, Ind., was elected first vice-president; PHILIP PAOLELLA, Plasticrete Corp., Hamden, Conn., second vice-president; and GEORGE W. KATTERJOHN, JR., Katterjohn Concrete Products Co., Paducah, Ky., third vice-president. HAROLD L. SPAIGHT, Cedar Rapids Block Co., Cedar Rapids, Iowa, was elected secretary-treasurer.

### Directors

Newly-elected to the Board of Directors for three year terms are Glenn Barnes, Barnes and Cone, Syracuse, N. Y.; Horace Bush, Multiplex Concrete Co., East Orange, N. J.; and Otto Buehner, Otto Buehner and Co., Salt Lake City, Utah.

Completing the Board, in addition to the officers and chairman Deane R. Lynde, are: Claude W. Chandler, Chandler Materials Co., Tulsa, Okla.; Fred M. Kettenring, Graystone Concrete Products Co., Seattle, Wash.; James C. Henry, E. P. Henry and Son, Woodbury, N. J.; W. Chester Smith, The Cooksville Co., Ltd., Toronto, Ont., Canada.; L. E. Schwalbe, Economy Block Co., Wauwatosa, Wis.; and Austin Crabbs, Austin Crabbs, Inc., Davenport, Iowa. The officers comprise the executive committee, and retiring chairman J. E. Ehle becomes an ex-officio member of the Board of Directors.

Henry Buchholz, elected president

### Side-Lights

The industry had a volume of business approximating one billion 8- x 8- x 16-in., or equivalent, units in 1946, doubling the previous record of 500 million for the year 1941. During 1946, the Association accepted 119 new members thereby increasing the membership to 426 at the time of the convention. However, we are told that some 40 or 50 new members were added to the membership at this convention so the total is now in the neighborhood of 500.

There is no question but that the industry has come a long way toward greater perfection in production and in overall conduct of its business, individually and collectively, and that there exists a healthy competitive urge toward greater improvement between the various companies.

To further stimulate progress of benefit to the industry, Executive Secretary E. W. DIENHART announced the establishment of the Noble award. THOMAS W. NOBLE, Chicago, Ill., long-identified with the industry, has contributed $2500 for the award, whereby a $500 prize will be given for each of five years to the employe of a member company (or a company) who has contributed the outstanding suggestion to improve operating or merchandising phases of the business, adjudged of greatest value to the industry. Suggestions may be concerned with plant operation, new product development, new uses for industry products, cost accounting or almost any phase of industry activity. Past presidents of the Association will determine the winner of the annual $500 prize.

W. D. M. ALLAN, director of promotion, Portland Cement Association, was presented a fine set of pipes, with the admonition from Mr. Dienhart that "you now can smoke yourself to death," in appreciation of his many years of endeavor in the interests of the industry. Preliminary to this tribute, Mr. Dienhart introduced a number of active members of the industry

who at some time in their careers had served under and with Mr. Allan.

The convention closed with an inspection of the just-completed new concrete products plant of the Illinois Brick Co. in South Chicago, by several hundred members who made the trip in chartered buses and by private automobile. HENRY BUCHHOLZ, president-elect of the N.C.M.A., and JOHN GOODRICH, president, Illinois Brick Co., were hosts at the plant which, unquestionably, is one of the very largest and most modern in the United States. Of fireproof construction throughout, the general layout, handling of the aggregates, curing methods, and facilities for the transportation of units attracted much interest. With four Vibrapacs in operation, the plant apparently can manufacture 50,000-60,000 units per day. Following refreshments through the courtesy of the Illinois Brick Co., the entourage returned to the convention hotel.

Left to right: Paul Woodworth, Paul M. Fogel, John Strandberg, and Deane Lynde

## Apprentice Training Program

"The Apprentice Training Program —Its Relation to Increasing the Supply of Bricklayers" was the subject of an address by MAURICE M. HANSON, Assistant Director of Apprentice Training Service, Department of Labor, Washington, D. C.

In recognition that the supply of skilled building craftsmen is a bottleneck to building construction, a national system for apprentice-training has been set up as a function of government. Mr. Hanson's presentation was in the nature of a progress report and a plea that manufacturers of concrete masonry units work actively in support of the program.

Mr. Hanson emphasized that there can be no successful apprenticeship program under compulsion and that the training program must be and is a definite part of the collective-bargaining structure between labor and management. Labor and management must take the lead, he said, and control such a program in their bargaining. The function of the Apprentice Training Service, established as a permanent department in 1937, is to bring employers and labor together and then allow them to carry the program through.

Substantial progress has been made and, Mr. Hanson reported, 12 national agreements have been completed so far in the building trades, one of which is a bricklayer's training program. The collective bargaining, once an agreement is reached on a national plan, is between labor and the employer at the local level, setting up details as to wages, length of training, etc. Usually, he said, the wage scale for a trainee is 50 per cent of the journeyman rate of pay. Mr. Hanson said that the country is now 45 per cent on the way to a national apprentice program in the building trades but, he emphasized, all interested segments must help show young men that participation in the program will equip them for an honorable trade.

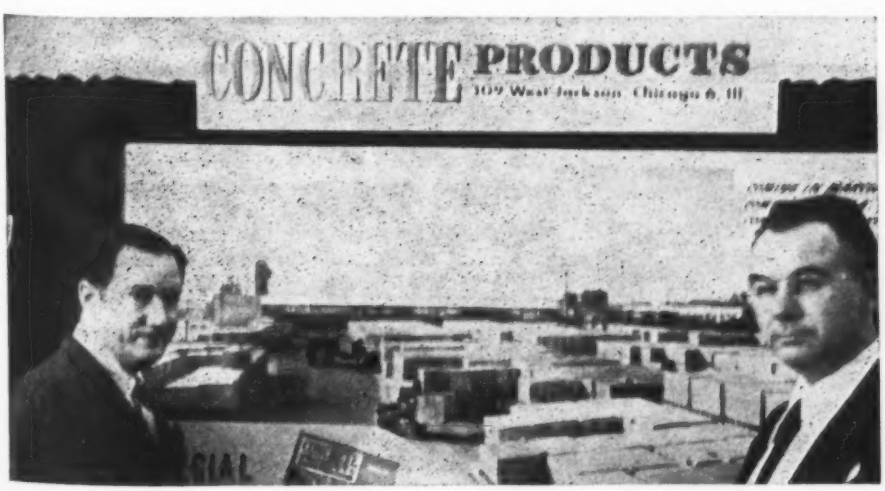
A panel discussion following Mr. Hanson's paper was led by Alfred Paolella, Hamden, Conn.; John L. Strandberg, Kansas City, Mo.; and Sam Paturzo, Baltimore, Md. Mr. Paolella told of the work the Plasticrete Corp. has done with labor unions and contractors, one plan under consideration being to set aside an area of the company's property where young men can actually have the opportunity to practice laying up walls.

John Strandberg said that in Kansas City the price of concrete masonry units is lower than in the '20's, along with an improved product, yet the number of masons was greater before the war than at present. One important reason given was that there were no apprenticeship programs active during the war. The need is for one apprentice for each three journeymen masons, he said.

Mr. Paturzo said that little effort has been made to accelerate the training period for apprenticeships, as one factor in the shortage of masons. In Baltimore, he said, only ten per cent of the apprentices have been found acceptable after a three year training period.

Joseph A. Wilder of Wilder, Van Slyke and Associates, Industrial and Labor Relations Consultants, Chicago, in his talk, "Labor Relations in the Plant," emphasized that a plant must have adequate grievance procedure and provision for job analysis and evaluation that will enable knowing the cost of one job in comparison with another.

One answer to a satisfactory labor-employer relationship, he said, was the application of common sense and fairness in mutual dealings. Throughout his brief talk, he kept emphasizing that employers must know the evaluation of a job, including such things as rest periods, vacations, etc., so commonly overlooked, in order to be able to negotiate fairly and accurately.




C. D. Wailes, Jr., left, with E. R. Ripley

## President's Address

D. R. LYNDE, retiring president, presided over the opening session of the convention, devoted to the presentation of reports to the membership and a consideration of the apprentice training program and the subject of labor relations.

Mr. Lynde's opening address was much longer than the usual presidential greeting, but was extremely in-

R. E. Copeland, left, and Paul Woodworth

Jay Ehle, Cleveland Builders Supply Co., and W. D. Allan, P.C.A.

E. W. Dienhart, left, with Ed. Weese of Carbon Brick Co.

Louis Gelbman, pioneer producer and inventor

formative. He, personally, and other officers and the staff had been very active during 1946 and had spent much time in the field visiting members and attending meetings over the country.

Mr. Lynde was very appreciative of the cooperation of the officers, Board of Directors, staff and the membership during a year which he described as a wonderful experience. He commented briefly on the healthy growth of the Association, the establishment of its new and enlarged quarters in the First National Bank Building, Chicago, and on the background of experience in technical matters that will be put to use by the industry in the person of Director of Engineering R. E. Copeland who was appointed May 1, 1946.

In detailing the growth of the membership, he extended a welcome to every producer to join, who has ethical intentions and a desire to share the responsibilities of the industry. The regular dues for membership are 25¢ per thousand 8- x 8- x 16-in. units, with a ceiling of $500. Substantial increases in dues have been contributed to the Association fund, entirely on an honor basis in reporting volume, he said, in stating that the Association is in a very sound financial position.

Mr. Lynde detailed the various meetings held by the executive committee during 1946, participation in regional meetings, also those of the curing committee and told of his visits to various outstanding plants over the country which he recommended that others visit. He was especially appreciative of the curing committee for its very active work and expressed his thanks to Paul Woodworth for his participation.

He concluded by stating that the industry is now the leader in the field of masonry products, and with a word of caution that the industry has relaxed its control over quality of product, of necessity, but must revert to quality considerations.

HENRY BUCHHOLZ, secretary-treasurer, followed with a very brief but satisfactory report of Association finances.

## Secretary's Report

EXECUTIVE SECRETARY E. W. DIENHART, in his annual report, commented on the remarkable growth of the industry during 1946. In stating that the billion unit (8- x 8- x 16-in.) volume had been achieved in 1946, to double the best previous year in the industry's history (1941), Mr. Dienhart said that the industry produced the equivalent of 11 billion brick-size units as compared to 6 billion for the clay and structural tile industries.

Mr. Dienhart sounded a note of warning that the industry is faced with a possibility of over-production and emphasized that rigid adherence to quality standards and vigorous merchandising policies will be absolutely essential for maintenance of high standards and for high output. He predicted that 1947 volume would equal that for 1946. He anticipates that cement supply would become critical about mid-1947 and urged that members anticipate their requirements well in advance in their dealings with the cement manufacturers. The Association is working toward the solution of the two principal bottlenecks to the industry—the shortage of lightweight aggregates and bricklayers, he said.

## Technical Problems

R. E. COPELAND, director of engineering, N.C.M.A., presided over the technical session, opening the meeting with an outline of the Association's technical program.

The objectives of the meeting, as pointed out by Mr. Copeland, were to consider ways to increase the use of concrete masonry by reducing cost of manufacture and by improvement of the quality of product, considering also the performance of concrete masonry in the finished structure. While much progress has been made toward low-cost operation, he stressed that still further economies must be attained through more effective plant layout and increased operating efficiency.

There will be a need to develop new outlets for business, he said, mentioning that concrete masonry floor systems and reinforced concrete systems merit investigation.

The high cost of erection and union restrictions on the size of units are factors which he mentioned, to emphasize the need for the industry to investigate labor-saving on the jobsite.

In discussing the technical activities of the Association, he described the work on high temperature curing accomplished at The Hurlbut Co. plant, Green Bay, Wis., by the curing committee. One of the technical reports already available, on that subject, is one covering the savings effected by insulating kiln roofs and walls. He told briefly of the work of the Technical Problems Committee and of projects to be undertaken in 1947 in pursuing further the subject of high temperature, accelerated curing.

Mr. Copeland is preparing design tables for filler-type joist floors based on American Concrete Institute design factors in order to conform with established codes, which will be made available to designing engineers. A field study of joint reinforcement is also under consideration, the object being to control shrinkage cracks. Ten technical reports will be released in 1947.

Jay C. Ehle, chairman of the Technical Problems Committee, reported briefly on the multitude of problems that confront the sub-committees, most of which are new and now in the formative stage of screening out the topics in most need of early attention.

PAUL M. WOODWORTH is chairman of the curing sub-committee on plant design, Richard Carpenter of the sub-committee on product development and construction practices, and Herbert Geist, of the sub-committee on aggregates and related materials. The sub-committee chairmen presented brief reports on their accomplishments and projected activities.

Paul Woodworth, in reporting on the activities of the curing committee, which has been active for several years, summarized the seven or eight meetings already held on the subject of high temperature and drying cycles, and on the work accomplished at several cooperating plants. He said that generally satisfactory results have been obtained in the curing temperature range of 170-210 deg. F., the objective of the present study. Units thus cured have exhibited less cracking, are lighter in color, have lower moisture content and have higher compressive strength. However, he did mention that a lower temperature, say in the range of 110-140 deg. F., may prove more practical and economical for some plants, when supplemented by additional curing and storage under cover. The objective of the study is, of course, to enable delivery as the units are taken from the kilns, within 24 hr. after they were molded. Mr. Woodworth then defined the procedure at the Hurlbut plant, Green Bay, Wis.

The holding period is the time elapsed when the kiln doors are closed until the steam is released, the range being from one to three hours. The steaming period (saturated steaming) is 12 hr. and the drying period (to less than 40 per cent contained moisture) is from three to six hours. During that period, outside air heated to 180 deg. F. is circulated through the kiln at the rate of one complete change per minute. Two other plants will be studied in 1947.

AUSTIN CRABBS, in reporting for the sub-committee on plant design, said that some 75 problems have been presented for study, but that the subject of yarding will be undertaken first since it afforded greatest opportunity for attaining substantial plant economy. He stressed the need for a uniform cost accounting procedure to guide the various sub-committees in their work.

The sub-committee on product development, according to chairman Richard Carpenter, will consider first the pressing problem of weathertight units and walls, particularly where lightweight units are used. He pointed out that architects are showing a great deal of interest in the lighter-colored aggregates and in exposed, colored units, which places greater emphasis on weather-tightness. Workmanship on the job is also to be studied.

HERBERT GEIST, chairman of the aggregates sub-committee, said that the first problem to be studied will be the ever-present phenomenon of segregation. Aside from the work of the sub-committees, Mr. Ehle and Mr. Copeland are working on a training program for superintendents and foremen.

Francis Straub, Stephen Flam, and H. Paulson

## Reinforced Concrete Masonry

C. D. WAILES, JR., Wailes-Bageman Co., Los Angeles, Calif., in a paper entitled "Reinforced Concrete Masonry—Its Merits and Applications," described in detail the reinforced masonry standards mandatory in California and which he believes may be adapted to various structures in order to expand markets. Earthquakes in California are responsible for specifications providing for reinforcing in all masonry structures. As a result, in California, reinforced masonry has been adapted to retaining walls and similar work and has obviated the necessity for poured or steel lintels on spans as much as 25 ft. Reinforced masonry has also been used for gasoline and oil storage tanks formerly limited to reinforced concrete or earth construction.

All structures of concrete masonry in the Los Angeles area must provide for reinforcing to tie in the walls to the floors. Details have already been published in ROCK PRODUCTS (see articles in December, 1945, pp. 149 to 151 and 153 in July, 1946, issue, pp. 121; also the article describing the new Wailes-Bageman Co. plant, February, 1947, pp. 121-125.

## Prefabricated Floors

O. NEIL OLSON, Head, Department of Civil Engineering, Marquette University, Milwaukee, Wis., in his talk on "Prefabricated Floors of Concrete Masonry Units," stressed that any system of prefabricated construction must be simple, foolproof and adaptable to architectural treatment.

His discussion largely dealt with the Dox precast floor and roof system developed by Cities Fuel and Supply Co., West Allis, Wis.

In the Dox system, precast units of special design to accommodate reinforcing are made on a conventional block machine, and assembled into planks, using the rods to hold the assembly together while ⅝-in. rods (2) are placed in recesses the length of the plank and until the concrete placed over the rods has set so the tie rod can be removed.

According to Professor Olson, from 3000 to 4000 sq. ft. of the planks, 16-ft. length, may be laid in 8 hr. and without shoring. For 14- to 16-ft. spans, the floor is designed to carry 60 lb. live load; weight is 33 lb. per

Throng of interested concrete products producers at machinery exhibit on the upper level

Looking down aisle of exhibits, to the right of entrance, upper level

Lower level of exhibits, looking down aisle to the right of stairway

Looking down aisle of exhibits, to the left of entrance, upper level

sq. ft. and 48 lb. after a 1½-in. topping is applied to a floor. The system has F.H.A. approval.

The Dox system was fully described in ROCK PRODUCTS (See Sept. 1946 issue, pp. 129).

## Symposium on Plant Problems

The symposium on plant operation developed many interesting suggestions to contribute to continuous plant operation and cost reduction.

HORACE BUSH, Multiplex Concrete Co., East Orange, N. J., led off with suggestions for the maintenance and repair of block machines, emphasizing the need for preventive maintenance and a supply of repair parts on hand, in order to have sustained production.

Lack of inspection will result in breakdowns at unopportune times according to Mr. Bush, who urges continual vigilance. In his opinion, reduction in costs is more important than increased prices, in order to assure profits.

Maintenance must be organized and adapted to the size of plant involved and to all sizes of plants. He believes that any plant with a production of 6000 units or more per day requires a maintenance man and a repair shop.

Daily inspection for loose bolts, hot motors, etc., is recommended, to be followed by immediate correction. Concentration should first be on points most likely to cause a complete shutdown of production. He mentioned bucket elevators for handling aggregates, conveyors, mixers, block machinery, lift trucks and boilers, in that order, as operations in need of constant attention. Screw conveyors of the type used for transport of bulk cement should be examined and gone over once a month, in his opinion.

The gears on mixers should be covered for protection against grit and, he said, vibratory block machines are in need of frequent checking since the eccentrics tend to loosen.

Wheel tires on yarding equipment, particularly of the solid rubber variety, should be kept in condition, he said, in order to minimize the cracking of block in transit. The installation of rubber bearing strips on racks was suggested as one way to minimize this damage.

Heat loss from kilns being directly in proportion to the differential in temperature, inside and outside, the high-temperature curing kilns can stand some attention, he reminded.

Worn out mold boxes and cores were mentioned as worthy of attention, for their adverse effect on dimensions of units, and holes in runways and rough pallets which are contributory to inferior products.

In the discussion following Mr. Bush's paper, R. A. UTIGER, Cinder Concrete Products, Inc., Denver, Colo., emphasized that it is very important to have a clean plant in order to improve working conditions and also to influence the opinion of a company's

product that results from observation of the plant.

He mentioned production figures on a modern block machine that, he said, prohibit any preventable shutdown. At his plant, a regular schedule of maintenance and repair is followed. The machinery is kept clean and greased on every shift, using compressed air at 200 p.s.i. and a hose fitted with a 2-ft. length of pipe to blow out dirt and grit from inaccessible parts and from all critical parts. The policy is not to run any machinery "too long" and to have plant operators who are familiar with the effects of improper inspection and maintenance. A spare motor is kept in stock for every need and a full time machinist is employed. Even the steam boilers are washed and cleaned every two weeks. In concluding, he said that enough cement has been saved alone from the use of a laboratory to justify that expenditure.

Sam Paturzo of Baltimore, Md.

## Hard Facing Welding

RALPH REINER, plant superintendent, Cleveland Builders Supply Co., Cleveland, Ohio, presented a very interesting paper on the use of hard-facing welding to cut down maintenance of crushers, mixer blades, and block machine cores and mold liners.

"Machinery designers," he said, "have attempted to combat the effects of these severe wearing conditions by fabricating the parts affected from so-called "wear-resistant" high carbon steels, chilled cast iron or manganese steels. Prior to the development of high quality hard-facing welding rods these materials were the best available. It is now, however, an accepted fact that a part hard-faced with a suitable alloy will out-wear a high carbon steel or chilled cast iron part many times. The purpose of the hard-facing overlay is to resist the wear for long periods of service, thus assuring the maintenance of the part at its maximum efficiency. When the hard-facing overlay eventually wears away it can easily be replaced by welding at a cost which is usually a fraction of that of a new part. In contrast a high carbon or chilled cast part of single metal construction is generally worn to the point where its operation is inefficient in an effort on the part of the plant operator to recover the cost of the part and to get through long production runs without shutting down the machinery for replacements. As a result, high carbon or chilled cast parts are usually worn too far to salvage economically by rebuilding and are relegated to the scrap pile after losing only a small fraction of their original weight.

"A composite part consisting of an inexpensive base metal such as medium carbon steel, protected on the working surfaces by a thin overlay of hard-facing alloy will outperform a part of single metal construction. Since, where hard-facing is specified, the base metal is selected for weldability it may be re-surfaced by welding an indefinite number of times when repairs are required, whereas, the solid "wear-resistant" types of metal shapes are often of an analysis unsuitable for welding, and rebuilding them by welding is difficult and expensive.

"Hard-facing welding is simple in principle. It may be described roughly as a method of melting or puddling a hard-facing alloy uniformly over the surfaces or leading edges of machine parts or tools for the purpose of prolonging their service life by protecting them against abrasion or a combination of abrasion, heavy impact and other kinds of wear. The thickness of hard-facing deposits may vary from 1/16 in. to ¼ in. depending upon the type and severity of the wear. The two methods commonly used in applying the hard-facing alloy to the base metal are: arc welding and oxy-acetylene welding. The arc welding process has the advantage of faster application and produces less heating effect on the base metal, thus reducing the tendency of the part to warp. Standard arc welding machines of suitable capacity are used in making arc applications. Hard-facing alloys are manufactured in both coated rod form for arc welding and in bare rod form for application with the oxy-acetylene torch. The average maintenance welder can, with a little practice, apply any of the better known hard-facing welding rods. His fundamental welding experience will enable him to avoid excessive warpage or the breaking of cast sections due to the effect of welding heats. However, as most hard-facing applications are individual cases involving varying degrees of wear, impact and other factors, it is advisable to obtain the advice of a competent hard-facing welding engineer before undertaking new applications. This is particularly necessary where large cast sections such as dry pan tires, crusher rolls or batch mixer blades are involved. The control of the welding heat put into the part being hard-faced is important as are also the proper sequences of the welds, the setting of the welding machine current, the determination of the most suitable hard-

(Continued on page 150)

Producers looking over exhibits, lower level, aisle to the left of stairway

John Goodrich, president, Illinois Brick Co., left, and Henry Buchholz

## Operation of Steam Boilers

A. A. HALTUG, The Hurlbut Co., Green Bay, Wis., who has had considerable experience in high temperature steam curing of concrete products, said that maintenance cost of boilers is very little when good operating practice is followed.

The boiler should be geared to the job, for an over-capacity boiler will operate below maximum efficiency, he said. It should be installed to provide sufficient room for maintenance and for the replacement of tubes. Mr. Haltug strongly advocated the use of automatic control devices, pointing to the fact that 7200 man-hours of labor would be required a year to man hand-operated boilers, an expense more than sufficient to justify the expense of an automatic boiler. There would also be a saving in fuel if a stoker was used, since stoker coal is cheaper and the actual firing is more efficient.

He recommends a low ash (6-8 per cent) coal of 13,500 b.t.u. heat value and with a top size of 1½- or 2-in., with less than 25 per cent minus ¼-in. A high percentage of fines would have more ash and a higher percentage of water, he said, which complicates firing control.

The treatment of boiler water is economical, he said, in pointing out that about one-half the water used in a boiler is makeup water. He pointed out that a 1/16-in. scale will cause a loss of ten per cent in fuel, or ten per cent of the cost of 1000 tons of coal a year at his plant. On the other hand, the cost of boiler water treatment is not greater than $200 a year.

He recommends cleaning the boiler flues three times a day and suggested that periodic inspection be made.

## Cost Accounting

P. M. CLEMENT, Katterjohn Concrete Products Co., Paducah, Ky., concluded the technical session with a presentation of production cost accounting and control as practiced in his company. Mr. Clement used sample figures to illustrate how all cost records, including those for overhead and indirect operating costs, are kept.

## Merchandising

E. W. DIENHART, executive secretary, was chairman of the concluding session devoted entirely to the subject of merchandising — a most timely meeting in view of the fact that the industry is faced with having a possible over-capacity, with a buyer's market in prospect.

W. G. KAISER, manager of the Farm Bureau, Portland Cement Association, very ably presented the part that merchandising must play in building farm business in volume. Mr. Kaiser predicted that the volume in 1947 would equal that of 1946 for concrete masonry but, he cautioned, when lumber becomes plentiful much will depend upon how well the customer has been cultivated and how well he is being served.

Concrete masonry has gained preference with the farmer but, he reminded that the steel, lumber and plywood industries are conducting an aggressive sales and advertising campaign directed to the farmer trade. We must return he said, in citing the old P.C.A. slogan, to the policy of a quality product, economically manufactured and aggressively sold. By quality, he insisted is meant uniformity of quality.

While no codes govern insofar as farmers are concerned, he said that the farmer knows a good unit and, it is important to remember, does his own buying. He cautioned never to try to pass off culls on the farmers. When supply equals demand purchasers will examine costs critically so it will be up to the industry to see that its costs are in line with those for competitive materials.

Mr. Kaiser outlined the merchandising activities of the Portland Cement Association, directed specifically toward building business for concrete masonry on the farms. Only recently and after a great amount of promotonal work, has concrete masonry begun to be accepted favorably by the colleges and universities and been incorporated into their plans for farm buildings. The demand for the P.C.A. farm building plans has been extremely heavy. Advertising in national farm papers is reaching nine million readers and, in addition, through the 25 district offices of the P.C.A., 3½ million additional readers are reached through State and other local media.

Mr. Kaiser concluded with presentation of a new motion picture with sound, showing unlimited opportunities for concrete construction on the farm.

R. D. Emmons, consulting engineer, Syracuse, N. Y.

C. A. SIRRINE, Loree-Sirrine, architects, Ann Arbor, Mich., in a brief talk, "A House Plan Service as an Aid in the Promotion of Concrete Masonry Houses," presented some observations from an outside organization that has exhibited a great number of drawings that have been of service to the concrete masonry industry. His observation has been that too many "houses" have been built and not enough "homes" and, he observed, the time is now here for an energetic program to replace an overwhelming seller's market that is running its course.

He would consider it poor policy for the industry to be satisfied with only a foundation market while other materials are accepted for above grade construction. It is extremely important, in his opinion, that the highest standards of quality be maintained. Mr. Sirrine's firm is cooperating with the industry in furnishing plans to contractors which is a distinct selling service for the industry, while affording a financial aid to low income home buyers.

## Buyers Market in Prospect

JAMES M. CLEARY, Roche, Williams and Cleary, advertising counsellors, Chicago, presented a very interesting summary of advertising and other sales tools employed by leading merchandisers in the concrete masonry industry, in his talk "A Buyer's Market is in Prospect — Merchandising Again is in Order."

In his introduction he cautioned that a buyer's market catches up with all companies even though not necessarily in all sections of the country at the same time. He believes the supply of concrete masonry units will exceed the demand sooner than in some other industries, stating that the capacity of the industry will be 165 per cent in 1947 on the assumption of a 19 billion dollar volume of construction. Then he followed with a summary of highlights of merchandising practices within the industry.

JOHN S. CHASE, Chase Building Products, Fort Worth, Texas, was singled out as an outstanding example of the aggressive merchandiser. In 1946, this concern had a 2000 per cent increase in volume of sales as compared to its first year in business. In the late 1920's and in the 1930's, the company advertised consistently even

(Continued on page 147)

# Automatic Bin Controls

**Triangle Certified Concrete, Inc., San Bernardino, Calif., constructs new ready mixed concrete plant with equipment designed for rapid handling of aggregates and cement**

By WALTER B. LENHART

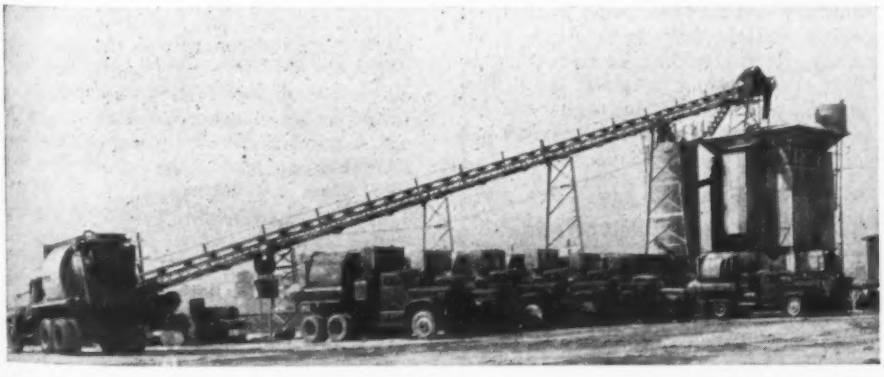
ABOUT a mile below the sand and gravel plant but closer to the business section of San Bernardino, the Triangle Certified Concrete, Inc., has built a new ready mixed concrete plant. A batching plant at Fontana and a transfer plant at Redlands, Calif., also are operated, providing service over a wide area in the rich agricultural and orange growing district of Southern California. This company is an affiliate of the Triangle Rock and Gravel Co. George Thwing, Jr., is president and general manager; Neal O. Baker and J. G. Mitchell, vice-presidents, and H. E. Olds, secretary and treasurer.

The plant is located at the intersection of three highways, two of which are important, and the neatness of the plant attracts the thousands of motorists who pass it daily. This in itself is a good advertisement.

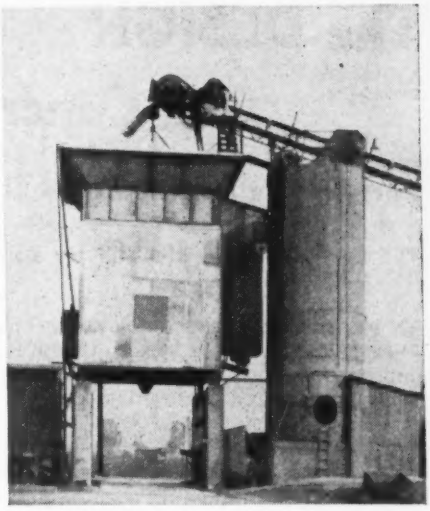
Aggregates are delivered to the batching plant by trucks which dump to a circular concrete hopper divided into four compartments, each compartment holding about 75 tons. Each compartment has a heavy timber and steel runway over it so the truck can load the quadrant to full capacity. The top of the road hopper is about road level. Under this hopper is a 24-in. inclined Boston Rubber Co. belt conveyor, 280 ft. centers, which elevates the aggregate to four steel hoppers over the batching equipment. These hoppers have a capacity of 160 tons. The belt is driven by a 40-hp. motor although it is planned to replace this motor with a 25-hp. unit when such are available. The total connected load is 85 hp.

The bulk cement handling section of the plant was supplied by the Conveyor Co. of Los Angeles. This whole assembly is built in the fabricator's shops and is moved to the user's site as one piece. About all that is necessary to erect the assembly is a concrete foundation and someone to connect up the three electric wires. The elevator for the bulk cement is built through the silo holding the cement. This can be more easily seen in the illustrations. The bucket elevator is driven through a Sterling system direct-power application. This reduces the 1500 r.p.m. motor speed to 130. Further reduction is through roller chains.

An interesting feature of this modern batching plant is the method of controlling the delivery of aggregate to the batching hopper, and its control from there to the weighing hoppers. On all the gates are air rams that open and close the clamshell type gates. The air rams are interlocked with magnetic switches in such a manner that the operator at the batching hopper, by pressing a button, can deliver any sand or aggregate to its proper bin over the main



Long conveyor inclining up to the top of aggregates bins from hopper below ground level, facilitates dumping by trucks from parent company's gravel plant



Cement silo to the right, and aggregates bins to the left

plant. When the bin is full a steel and rubber diaphragm attached to the interior (and near the top) of each bin breaks the electrical circuit and closes the open gate. Red lights at the batching plant keep the operator informed as to the height of material in each bin. The operator diverts the aggregate to its proper bin by a spout controlled from his station. Thus one man runs the entire plant, and runs it easily as he seldom has to leave his post at the plant. The assembly was developed jointly by the company and the Conveyor Co. About 40 c.f.m. of air is used.

## Air Controlled Bin Gates

At the batching hopper similar air controlled gates are used, but the air valves here are manually operated. Bulk cement is delivered to a track hopper and through a screw conveyor and elevator to the steel silo holding 400 bbl. of cement. Cement is delivered to the batching plant by a short inclined screw conveyor. This screw delivers to a separate weighing hopper where the cement is automatically weighed. The hopper discharges direct to the mixer trucks through a spout that goes through the aggregate hopper. Dust is thus kept to a minimum.

The 4-cu. yd. batcher was assembled by the owner, using Hardy Scale Co. and Conveyor Co. equipment. The gates feeding it are of the clamshell type. Kron scales are used. The plant, which has been in operation about three months, has a fleet of ten Rex and Jaeger mixer trucks of 4-cu. yd. capacity, mounted on Diamond T, Sterling, and Ford trucks. Part of this fleet is used at the nearby Fontana plant when necessary. The ready mixed concrete plant has a capacity of 80 cu. yd. per hour as a normal load and 120 cu. yd. per hour if pressed.

# The DESIGN of Concrete Mixes

## Part 5: The Arithmetic of Design for Quality and Economy

By R. E. ROBB*

IN PREVIOUS ARTICLES of this series on designing concrete mixes, the preliminary studies and determinations to secure required quality at minimum cost were discussed. In this article will be developed the very simple arithmetical calculations necessary to completely design, or re-design, any mixture to meet job conditions.

The four most common types of specifications governing concrete proportioning are (1) 28 day compressive strength; (2) Water/Cement Ratio; (3) Cement Factor (Number of pounds or bags of cement per cubic yard); (4) Definite proportions of cement, sand and coarse aggregate. The design for each type will be discussed.

Accurate control of concrete proportioning requires that all ingredients, except possibly water, be weighed. The end object in concrete design is to insure that the proper weights of each ingredient necessary for required quality are in the mix, and that the sum of these weights will give a definite volume of the mixed concrete. The only practical way in which weight can be converted into volume is by using the specific gravity of each ingredient, as was brought out in the first article of this series, "Specific Gravity—The Key to Scientific Concrete." The problem then which confronts the concrete designer is to determine quality requirements and then design his mix so he will secure maximum economy with required quality, and so that the yield will be exactly the volume desired per batch, usually one or more cubic yards. Quality, as brought out previously, is primarily a function of the cement/water ratio; economy is achieved by using as little of the cement/water paste as possible for required placeability.

Concrete design requires the use of the absolute volumes of the various ingredients; i.e., the total of the volumes of each separate particle in the cement and the various aggregates, plus the volume of total mixing water, which includes water carried in by the aggregates. If the sum of these absolute volumes totals one cubic yard, the volume of the concrete delivered to the job will be slightly in excess of one cubic yard on account of the entrained air, hence will be on the safe side as regards quantity delivered. The absolute volume of a given weight of a substance made up of insoluble particles, such as cement and aggregate, is determined by dividing the weight of the substance by its specific gravity. This gives the weight of water equivalent in volume to the absolute volume of the material. For example, if 350 lb. of cement, with a specific gravity of 3.12 is to be used, $350/3.12 = 112$, the number of pounds of water of the same volume as the sum of the volumes of the cement particles. 112 lbs. divided by 62.4 (the weight of one cubic foot of water) = 1.80 cu. ft., and this divided by 27 gives 0.0666 cu. yd., the absolute volume of 350 lb. of cement. This operation is usually written $350/3.12 \times 1/62.4 \times 1/27 = 0.0666$ cu. yd. Similarly the absolute volumes of the various aggregates are found, using their respective specific gravities. Since the specific gravity of water is one (1.00), no conversion is necessary for it.

One of the important characteristics required for concrete, especially when used on construction work, is placeability. This is largely a function of the relative amounts of fine aggregate and water in the mix. Hence for convenience in design, total sand is expressed as a percentage of total aggregate. Sand may then be broken down into percentages of regular and fine, and coarse aggregate into percentages of its various sizes. If this is done, it becomes very easy to change the mix to meet job conditions by increasing or decreasing the cement/water paste and/or the percentage of sand to coarse aggregate. If the preliminary work as discussed in the preceding article has been done accurately, it will seldom be necessary to alter the relations between the different sizes of coarse aggregate or between the sands to meet varying job conditions.

### Design to Meet Strength Specifications

The solution of a typical design problem will illustrate the operations involved.

It is required to design a concrete mixture for 28-day compressive strength of 2500 p.s.i., with 1½-in. gravel the maximum size of aggregate allowed. The following data have previously been determined:

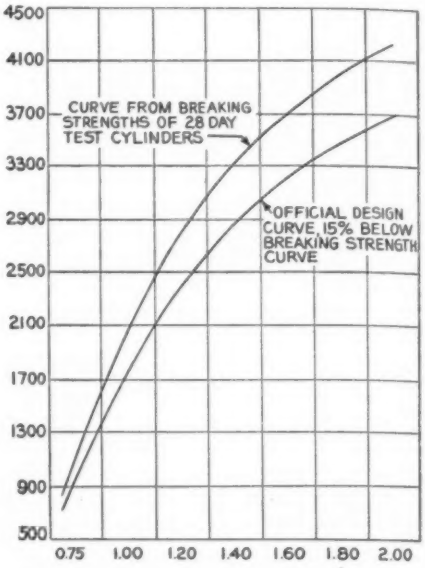



Fig. 1: Concrete design curves to determine cement-water ratios

*Specific Gravities of Ingredients*: Cement—3.12; Sand, both regular and No. 50—2.67; Coarse aggregate, all sizes—2.69.

*Optimum Ratios of Aggregates:* Sand—39 per cent, Coarse Aggregate—61 per cent of total aggregate. Sand only—No. 50—5 percent, Regular—95 per cent; Coarse Aggregate only: No. 1—18 per cent, No. 2—40 per cent, No. 3—42 per cent No. 1 is through ⅝-in. holes and retained on 3/16 in., No. 2 is from 1-in. to ⅝-in., No. 3 is from 1½-in. to 1-in.).

*Step No. 1: Determine Cement/Water Ratio Required*

Use Official Design Curve, Fig. 1. Go into the chart on the 2500-lb. strength line to where it crosses the Official Concrete Design Curve. This is at the vertical line for Cement/Water ratio of 1.24. Hence the required C/W Ratio is 1.24.

*Step No. 2: Determination of Total Weight of Mixing Water*

Experience is the best guide for this. It will probably fall between 280 lb. and 320. For preliminary design take the lower figure, 280. The total weight of mixing water per cubic yard of mixed concrete is the starting point in determining quantities and, since it also is one of the most important factors in the control of strength and other desirable qualities in the hardened concrete, the amount used is of vital importance.

*Step No. 3: Determination of Weights and Absolute Volumes of Ingredients (See table next page)*

The design is made for *total* mixing water, which includes all of the water carried into the mix with the aggregate. It will be necessary to determine the amount of free water in each aggregate and then make the

*Consulting Engineer.

*Step No. 3:*

Water Weight—280 lbs. Abs. Vol. 280 × 1/62.4 × 1/27 = 0.166 cu. yd.
Cement Weight—280 × 1.24 (Step 1) = 347 lbs. (Use 350 in design)
Abs. Vol. 350/3.12 × 1/62.4 × 1/27 = 0.067 cu. yd.

Absolute Volume Cement/Water Paste (Sum of above) ..... 0.233 cu. yd.
Absolute Volume of total aggregate (Space left in one cubic yard) 1.000 — 0.233 = 0.767 cu. yd.
(Check addition 0.233 plus 0.767 = 1.000)
Abs. Vol. of sand required 39% of 0.767 = 0.299 cu. yd.
Abs. Vol. of coarse aggregate 61% of 0.767 = 0.468 cu. yd.

Check additions 100% 0.767 cu. yd.

*Step No. 4: Determination of Weight of Each Size of Aggregate*

| | | | |
|---|---|---|---|
| Sand No. 50 .05 × 0.299 = 0.015 cu. yd. × 2.67 × 62.4 × 27 = 67 (Use 70) | | 70 lbs. | |
| Reg. .95 × 0.299 = 0.284 cu. yd. × 2.67 × 62.4 × 27 = | | 1270 lbs. | |
| Total Sand ..... | 0.299 cu. yd. | | 1340 lbs. |
| Coarse Aggregate | | | |
| No. 1 .18 × 0.468 = 0.084 cu. yd. × 2.69 × 62.4 × 27 = | | 380 lbs. | |
| No. 2 .40 × 0.468 = 0.187 cu. yd. × 2.69 × 62.4 × 27 = | | 850 lbs. | |
| No. 3 .42 × 0.468 = 0.197 cu. yd. × 2.69 × 62.4 × 27 = | | 890 lbs. | |
| Total Coarse Agg. | 0.468 cu. yd. | | 2120 lbs. |
| Cement (Step No. 3) | 0.067 cu. yd. | | 350 lbs. |
| Water (Step No. 3) | 0.166 cu. yd. | | 280 lbs. |
| Totals ..... | 1.000 cu. yd. | | 4090 lbs. |

necessary deduction from the mixing water added.

When delivery of a new concrete design starts on a job, the placeability of the mix as delivered should be watched. It may be necessary to make only slight changes, but it is vitally important to the ready mixed concrete operator that his customers be satisfied, and often only a slight change means the difference between a satisfied and an irate customer. For example, it may be found to be somewhat harsh, requiring more sand to give proper finish. More sand will also require more paste unless it was found that the mix was wetter than really needed. A relatively small increase in the percentage of sand will often make a considerable difference in the handling of the concrete. Suppose it is decided to increase the sand 1 per cent and the water 10 lbs. The mix can very quickly be re-designed, substituting 290 for 280 and 40 per cent for 39 per cent. It will not usually be necessary or wise to change the proportions of the sands or of the coarse aggregates. However, if it should be found that the mix seemed stony and that a higher percentage of the small aggregate, No. 1, would be better, the proportions of aggregate might be changed from 18-40-42 to 20-40-40. It should always be kept in mind that both quality and economy are promoted when the larger sizes of aggregate are used in preference to smaller sizes, within the limits of required placeability.

## Design to Meet Water/Cement Ratio Specifications

Water/Cement and Cement/Water ratios are each the supplement of the other. For example, to convert a W/C ratio of .80 to a C/W ratio, divide 1 by .80 (1/.80) = 1.25.

The problem in this type of design is practically the same as in the previous one, the only difference being that the ratio of cement and water is given instead of being taken from the strength curve. Exactly the same procedure will be followed in designing the mix.

## Design to Meet Cement Factor Specifications

Under this type of specification the weight of cement in a cubic yard is fixed; e.g., 5 bags (470 lbs.) per cubic yard. The assumptions used in the design to meet Strength specifications will be used except for the amount of cement.

*Step No. 1:* This is eliminated as neither Strength nor Cement/Water Ratio are involved.

*Step No. 2: Determination of Weight of Total Mixing Water*

If job conditions are the same as those in the case previously used, it will probably be necessary to use slightly more water because of the increased amount of cement. Try 300 lbs.

Water Weight—300 lbs. Abs. Vol. 300 × 1/62.4 × 1/27 = 0.178 cu. yd.
Cement Weight—470 lbs. Abs. Vol. 470/3.12 × 1/62.4 × 1/27 = 0.090 cu. yd.

Absolute Volume Cement/Water Paste ..... 0.268 cu. yd.

*Step No. 1: Determination of Absolute Volumes of each Dry Ingredient with 1 Bag Cement.*

| | | |
|---|---|---|
| Cement ..... | 94.0 × 1/3.12 × 1/62.4 × 1/27 = | 0.0179 cu. yd. |
| Sand ..... | 208 × 1/2.67 × 1/62.4 × 1/27 = | 0.0462 cu. yd. |
| Coarse Aggregate .. | 440 × 1/2.69 × 1/62.4 × 1/27 = | 0.0975 cu. yd. |
| Total Absolute Volume of Dry Ingredients per Bag Cement ..... | | 0.1616 cu. yd. |

*Step No. 2: Determination of Absolute Volume of Water to be Used per Cubic Yard.*

Assume 300 lbs. of total mixing water per cubic yard
Absolute Volume of water 300 × 1/62.4 × 1/27 = 0.178 cu. yd.
Volume to be filled by cement and aggregate 1.000 — 0.178 = 0.822 cu. yd.

*Step No. 3: Determination of Weight of Each Dry Ingredient per Cubic Yard.*

The number of bags of cement, with corresponding sand and coarse aggregate to be used per cubic yard will be: 0.822/0.1616 = 5.09. The weights of each material per cubic yard then are:

| | | |
|---|---|---|
| Cement ..... | 94 × 5.09 = | 478 lbs. |
| Sand ..... | 208 × 5.09 = | 1060 lbs. |
| Coarse Aggregate .. | 440 × 5.09 = | 2240 lbs. |
| Total weight per cu. yd. ..... | | 4078 lbs. of cement and aggregate. |

In a design of this type it is advisable to check the absolute volume of the designed mix as follows:

| | | |
|---|---|---|
| Abs. Vol. of Water | 300 × 1/62.4 × 1/27 = | 0.178 cu. yd. |
| Abs. Vol. of Cement | 478/3.12 × 1/62.4 × 1/27 = | 0.091 cu. yd. |
| Abs. Vol. of Sand | 1060/2.67 × 1/62.4 × 1/27 = | 0.236 cu. yd. |
| Abs. Vol. Coarse Aggregate | 2240/2.69 × 1/62.4 × 1/27 = | 0.495 cu. yd. |
| Total Absolute Volume per Cubic Yard..... | | 1.000 cu. yd. |

The subsequent steps in the design are identical with those for Strength Specifications except that the new value for the paste is used.

## Design to Meet Definite Proportions Specifications

Under this type of specification the proportions of cement, of fine aggregate and of coarse aggregate are determined in advance. This may be either on a dry, rodded volume basis or on a weight basis. Most specifications are now on a weight basis. However, since dry, rodded volume is still occasionally used, the example will be based on that type of specification.

Suppose the specifications call for the time honored 1:2:4 proportions of cement, fine and coarse aggregate on a dry, rodded basis. It will be necessary to room-dry samples of the combined sands and the combined coarse aggregates to determine the weight of the dry rodded volumes. Suppose these are found to be, per cubic foot: Cement, 94 lbs.; Sand, 104 lbs.; Coarse Aggregate, 110 lbs. The weight proportions, which will be used in the design, are then: 94:208:440. In this type of design the steps do not conform to the previous types of design. The same basic data as used in the preceding examples will be used.

In some cases this type of specification may require a definite amount of water per bag of cement. This binds the designer and user down so closely that it will frequently be found to be unworkable — the resulting concrete

will either be too dry or too wet for placeability. However, in making the preliminary design under these conditions, the absolute volume of water per bag of cement will have to be included in Step No. 1. The balance of the design will then follow the same steps as above.

* * *

Fig. 2 is a suggested form for use by the concrete designer or technician in designing mixes. By the use of this form and a slide rule, a mix can be completely designed, or re-designed, in a very few minutes—tailor made to fit the job—with assurance that both quality and economy factors have each had their proper weight. This form will be found useful in designing mixes for the first three types of specifications discussed—Strength, Water/Cement or Cement/Water Ratio and Cement Factor. It is not well suited for design to meet Definite Proportions Specifications.

It is believed that a little study of the reference letters and numbers will make the operation of this form clear. It is suggested that these be prepared by the concrete manufacturer in pads, in single copy, with each form serially numbered if desired. Each time a mix is changed for a job the design should be recorded on one of these forms and filed for future reference.

A compound number to denote, at a glance, the type of mix used has been found to be very convenient. In the problem worked out under Strength Specifications, the Mix Type would be 25-3-39-280, where 25 stands for 2500 pounds per square inch, 3 denotes that No. 3 was the largest size of aggregate used, 39 denotes that the per cent of sand to total aggregate was 39 per cent, and 280 is the number of gallons of water used per cubic yard. After a little use, a glance at this type number tells the engineer exactly what concrete was used on the job.

The next article of this series will be concerned with the actual operation of a precision controlled concrete manufacturing plant — ready mixed concrete, contract job, or concrete products.

Fig. 2:

ABC READY MIXED CONCRETE COMPANY
1634 Green St. Atlanta, Ga.

Customer: Name..... Address..... (Form Serial No.)
Job: Name..... Address..... Number .....
SPECIFICATIONS—Strength (A) lbs. @ 28 days; Water/Cement Ratio (B); Cement/Water Ratio (C)
JOB REQUIREMENTS—Maximum size aggregate (D) inch (No...(E)); Slump ... inch.
PREVIOUS DETERMINATIONS—*Specific Gravity:* Cement (F), Sand (G), Coarse Aggregate (H)
*Aggregate Ratios:* Sand: No. 50 (I)%, Reg.* (J)%; Coarse No. 1 (K)%, No. 2 (L)%, No. 3 (M)%, No. 4 (N)%
*Cement/Water Ratio* for required strength (O)
ASSUMPTIONS—*Water:* (P) lbs. total per cu. yd. *Ratio of Aggregate Totals:* Sand (Q)%, Coarse (R)%

DESIGN OF MIX FOR 1 CUBIC YARD MIXED CONCRETE

| | | Wt. Per Cu. Yd. | Batch Weights |
|---|---|---|---|
| WATER | | | |
| Abs. Vol. (P) lbs. × 0.000594† = | 0. (1) cu. yd. | | |
| CEMENT | | | |
| Abs. Vol. (P) lbs. × (O) = (2) lbs. × 1/(F) × 0.000594 = | 0. (3) cu. yd. | | |
| Total Absolute Volume of Cement/Water Paste ..... | 0. (4) cu. yd. | | |
| Total Absolute Volume of Aggregate: 1.000 — 0. (4) = 0. (5) cu. yd. | | | |
| SAND | | | |
| Total: Abs. Vol. (Q)% × 0. (5) = 0. .... cu. yd. × 1680‡ = (6) lbs. | | | |
| No. 50 (I)% × (6) lbs. = | | ..... lbs. | ..... |
| Reg. (J)% × (6) lbs. = | | ..... lbs. | ..... |
| COARSE AGGREGATE | | | |
| Total: Abs. Vol. (R)% × 0. (5) = 0. .... cu. yd. × 1680 = (7) lbs. | | | |
| No. 1 (K)% × (7) lbs. = | | ..... lbs. | ..... |
| No. 2 (L)% × (7) lbs. = | | ..... lbs. | ..... |
| No. 3 (M)% × (7) lbs. = | | ..... lbs. | ..... |
| No. 4 (N)% × (7) lbs. = | | ..... lbs. | ..... |
| *Total Aggregates* 0. .... cu. yd. .... lbs. | | ..... lbs. | ..... |
| *Water* ..... 0. (1) cu. yd. | | (P) lbs. | ..... |
| *Cement* ..... 0. (3) cu. yd. | | (2) lbs. | ..... |
| Mix Totals ... .... cu. yd. | | ..... lbs. | ..... |

Mix Type..... First Del. Ticket..... Design No. for this Job.....
Designed by..... Date..... Hour.....

* "Reg." means regular concrete sand without the addition of No. 50.
† 0.000594 = 1/62.4 × 1/27
‡ 1680 = 62.4 × 27

## Lightweight Aggregate Plant for Sale

THE WAR ASSETS ADMINISTRATION recently offered a lightweight aggregate plant for sale or lease. This plant, located at Ellenton, Fla., cost the government $541,000, and was built by the Maritime Commission for production of nodulite, used as a lightweight aggregate in concrete for ship construction.

## Erect Stone Plant

BLUFFTON STONE CO., Bluffton, Ohio, has constructed a new crushed stone plant for the production of agricultural limestone and stone sand. Raymond Conrad, manager of the company, has announced that the new plant will have a capacity of 200 tons daily. Much of the stone sand production will go to the Bluffton Cement Co., which recently started operations.

## Open Gravel Deposit

ELKHORN CONSTRUCTION CO., Norfolk, Nebr., has opened a gravel pit near the Elkhorn river. Sand and gravel will be dredged from a wet pit, and pumped to a screening and washing plant. F. H. Medelman, bridge and excavating contractor, owns the Elkhorn Construction Co.

## Vermiculite Concrete Houses

GEORGE F. PRATT of Grand Rapids, Mich., is making prefabricated houses of vermiculite concrete panels. The panels are made by pouring a vermiculite concrete mix into a light steel reinforcing frame, making a panel 3 in. thick, 16 in. wide, and in 6 and 8-ft. lengths. The cured 6-ft. panel will weigh 90 lbs. In construction, the panels are erected in place side by side and the steel panel angles are welded together with a mix of vermiculite concrete. Panels are fitted closely to steel-self-trim doors and window frames, also fashioned into the desired shapes in Mr. Pratt's plant. Cementing the panels to the frames eliminates planing and fitting wood trim.

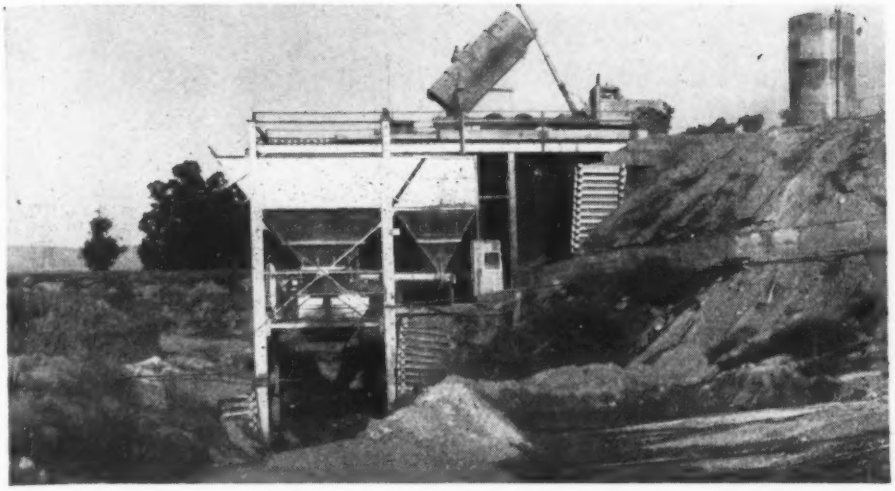
## Scholarship Contest

LITTLE ROCK LUMBER & COAL CO., Alma, Mich., is sponsoring a scholarship contest for one-year tuition to Alma College, valued at $300. The contest is open to graduating members of the 1947 senior class of Alma High School, except members of the sponsoring organization or their immediate families.

Contestants will compete for the best essay of not over 1000 words on the subject, "Why I Prefer a Home Built of Cinder Block." The contest opened February 1, 1947, and all entries must be postmarked not later than April 1, 1947. Roy W. Hamilton, president of the college; Clark R. Ackley, architect; and Paul Cash, Judge of the Circuit Court, are the judges. The Little Rock Lumber & Coal Co., is a well-known producer of concrete products and ready mixed concrete, and building supply dealer in this area.

## Architects' Competition For Best House Design

THREE COMPANIES in Connecticut are sponsoring an Architectural Competition, inviting architects to participate in a competition for three prizes to be awarded for the best designed firesafe home using Plasticrete Bloc wall and Lith-I-Bar floor construction. The three sponsoring companies are: The Dextone Company, New Haven; The Wm. M. Hotchkiss Co., New Haven and Bridgeport; and Plasticrete Corporation, Hamden. The winning designer will be awarded $1000; the design placed second will be awarded $350; and the third prize will be $250; and there will be honorable mentions as decided by the jury. The winning design home will be erected in Hamden, and will be opened for inspection and widely publicized.



Bulk cement truck dumping direct to storage bin. Note aggregate bins, to the left, and screw conveyor from cement bin to batching equipment; flow is all-gravity

# Gravity Flow Ready Mix Plant

## Service Rock and Sand Co., Riverside, Calif., builds ready mixed concrete plant in gravel pit

By W. B. LENHART

IN 1943 the Service Rock and Sand Co. took over the operations of the old sand and gravel plant formerly operated by the Concrete Conduit Co., Riverside, Calif. The pipe manufacturing company continues to obtain its requirements from this plant. Adjacent to the older sand and gravel plant, the company built a ready mixed concrete plant that operates under the name of the Concrete Rock and Sand Co. The company uses six Jaeger mixer trucks, three of which are mounted on Brockaway trucks and the other three on Internationals. A seventh mixer is used on a rental basis.

The batching plant was erected in a worked out sand pit with the top of the plant about level with the normal ground levels, making it possible to deliver bulk cement and aggregate direct to the storage bins without elevators. Batching and weighing equipment was assembled by Carlinghouse Bros. of Los Angeles, Calif. Kron scales are in use. Water is measured out to the truck mixer drum by a Neptune meter. The batcher has a capacity of 4-cu. yd.

For concrete in this section the following mixes (in lbs.) are used:

| | "Ordinary Mix" lbs. | "State Mix" lbs. |
|---|---|---|
| Coarse sand | 5300 | 6000 |
| Silt sand | 1000 | none |
| Cement | 1700 | 2250 |
| ¾-in. rock | 3610 | 2400 |
| 1½-in. rock | 3590 | 5200 |
| Total weight | 15200 | 15850 |

Water is added at the rate of 30 to 35 gal. per cu. yd. depending on the moisture content of the sand. Stanley Jacobsmeyer is in charge of the ready-mixed concrete plant.

The company is planning to build a 2000-ton per 8-hr. day sand and gravel plant in the vicinity of its present operation to take care of the increasing ready mixed concrete business. It will largely duplicate the Service Rock layout but will be more modern and of larger capacity. Working a deposit which is largely minus 1½-in. material allows for a very simple plant.

### Doubles Capacity

MULTIPLEX CONCRETE MACHINERY Co., has acquired a plant at nearby Oak Harbor which practically doubles the production capacity, according to President Frank Muenzer. The general offices will continue in Elmore, Ohio. Facilities at the Oak Harbor plant supplement those in Elmore. They include a straight line assembly setup for the large block machines and mixers in addition to a new stock and service department. Fifteen different types of concrete products machines and 11 different sizes of mixers will be built.

### Brick Faced Block

WILLISTON CONCRETE PRODUCTS Co., Williston, N. Dak., has been organized by Harry L. Hieb and Robert Le Seur to make a new type concrete block which will have a facing that looks like brick. Patents have been applied for this unit. In addition to block, the company will make concrete sills and lintels, well curbing and drainage tile.

### Large Curing Capacity

CAROLINA QUALITY BLOCK Co., Greensboro, N. C., started production of lightweight (slag) concrete masonry units in September, 1946, in a modern and efficient plant. Although the plant is not as yet completed in all of its proposed refinements due to inability to obtain equipment, blocks have been made and a stockpile is being built up. The plant is equipped with five steam curing rooms capable of containing 5000 units. Steam is provided by a Cyclotherm boiler and block are produced on a No. 9 Stearns Joltcrete. Block are moved to the rooms by a Salsbury lift truck, and are yarded and cubed by an Erickson lift truck. The runways in the large storage area are concreted. When the plant is complete, it will contain a Besser Super Vibrapac to augment the Joltcrete as well as a Johnson Octobin for storage of aggregates. A bulk cement system will also be installed.

R. M. Dinkel is president of the company, and F. H. Forsyth is vice-president. Joseph A. Bass, a building construction man from Minnesota, is treasurer.

### Monolith Sues R.F.C.

MONOLITH PORTLAND CEMENT Co., Los Angeles, Calif., has filed suit for an injunction and $7,500,000 damages in Superior Court against the Reconstruction Finance Corporation, charging that the government corporation has breached a contract for the erection of a plant in Laramie, Wyo. The suit alleges that under an agreement signed January 28, 1943, R.F.C. contracted to advance $4,639,048 for the construction of a plant to test, during the war emergency, a process for the production of aluminum ore from clay.

In keeping with the contract, the Monolith company deeded 40 acres of land to R.F.C. for the plant, which was near completion last September 10 when the government agency served notice of cancellation of the entire agreement. It is contended by the cement company that R.F.C. had no right to such a cancellation until at least 90 days following the completion of the plant and production of its first ore.

### Adding Ready Mix

SOUTHERN STATES MATERIAL Co., Birmingham, Ala., a manufacturer of concrete block, also has gone into the ready mixed concrete business, and has purchased 12 mixer trucks.

### Expands Ready Mix

THE WESTERN SAND AND GRAVEL Co., Spring Valley, Ill., has purchased property in La Salle, Ill., with the object of expanding its ready mixed concrete services in this community.

# Aggregate Division Meetings

## National Concrete Masonry Association sectional meetings draw out spirited discussion on special problems

GENERAL SESSIONS of the convention were preceded, on February 17, by concurrent sessions of the Aggregate Divisions; the Cinder Aggregate Division, Celocrete Aggregate Division, Haydite Aggregate Division, Pumice Aggregate Division, Superock Aggregate Division and the Waylite Aggregate Division. These division meetings have become an annual event, for the purpose of discussing problems that are peculiar to the several aggregates in common use.

Discussions at these meetings, generally, considered practical problems in handling the various aggregates, proportioning, mixing times, the use of air-entraining agents, admixtures, curing and other factors having a bearing on product improvement and economy of operation.

Cinders being seriously short of supply, much of the Cinder Aggregate meeting was devoted to ways and means of improving through processing, some of the cinders that must, of necessity, be used. The apparatus developed by the Portland Cement Association, available for individual plant use, for the visual classification of cinders on the basis of staining on filter paper was given thorough consideration. The apparatus, which is simple of application and found very practical by users, was available for inspection at the speakers' table. Cost of the device, discussed at last year's meeting and described in detail in recent issues of ROCK PRODUCTS, is approximately $65 total.

LOUIS GELBMAN, Concrete Units, Inc., New York, N. Y., again described the Sinter-Lite process that he has perfected for the production of sintered fly ash-slag aggregate, and Frank Leftwitch, chief engineer of the company, answered a number of questions from the floor which were indicative of the tremendous interest in possible new available sources of supply of lightweight aggregates.

Mr. Gelbman described the process in some detail and said that an arrangement had just been completed whereby a large manufacturer of concrete products machinery will manufacture the sintering machinery for marketing. It is said that many materials such as ordinary fire clays, sands, limestones, etc., can be converted into good lightweight aggregates, locally, by the process of sintering and, said Mr. Gelbman, he now has laboratory facilities available for testing samples of raw materials for their utility in the process. The standard plant to be available has a sintering capacity of 100 cu. yd. in 8 hr., and the cost of production, exclusive of screening and crushing, is estimated at 30 to 35 cents per cu. yd., depending upon the carbon content of the mix and on other variables.

In a discussion of the application of water for moist storage of cinders in stockpiles, preferably after crushing, and the lime treatment of cinders, both considered satisfactory procedure to improve cinder quality, it was mentioned that seven days was a good average requirement for moist, or wet, storage of cinders to overcome the adverse effect of over-burned lime contained in the cinders. For lime treatment (lime water) the requirement is six to eight bags of dry lime per carload of cinders.

### Natural Aggregates Meeting

Manufacturers of heavy aggregate units conducted an extremely interesting meeting that brought out much conflicting discussion pointing to need for further study. Principal topics considered were absorption requirements for concrete masonry units and the industry's ability to meet them, the correct grading of aggregates as a means of overall improvement of concrete units and the use of air-entraining agents and other additives.

On the matter of absorption, it was pointed out by one manufacturer that greater care in the selection and grading of aggregates, probably accompanied by longer mixing time, would be beneficial. The feeling of the meeting was that the proposed 5 per cent absorption figure not be recommended at this time, as a tightening up measure, for fear that some of the better block would be penalized as a result. It was mentioned that even if a unit has a maximum of 5 per cent absorption, it might have a total contained moisture as high as 55 per cent (A.S.T.M. requires 40 per cent top.). Ben-

Stephen Flam, right, with son

Luther Randolph of Ann Arbor, Mich, chatting with W. G. Kaiser of P.C.A.

jamin Wilk, Detroit, Mich., (author of the article "Influence of Grading on Strength of Concrete" in the February issue of ROCK PRODUCTS, pp. 169-170) gave a very informative talk on the important part that proper grading will have in attaining low absorption block of great compressive strength. He stressed the need for better control, mentioning that many aggregates are not uniform because they are purchased as a mix. He believes that three sizes of aggregates are necessary to control—a pebble, a sharp sand and a fine sand. If a 1000 p.s.i. compressive strength unit is specified, he would rather be able to meet the 1100 p.s.i. with regularity through the use of separate, weighed aggregates than to manufacture a unit to compressive strengths far exceeding specifications as is done by some manufacturers for insurance as to compliance.

AUSTIN CRABBS, Davenport, Iowa, said that he had manufactured units of 5 per cent maximum absorption for years and that such units are now specified in his area. In commenting on the 40 per cent contained moisture limitation of A.S.T.M. specifications, he too emphasized that proper grading is the answer, and probably through use of a third grade of aggregate. This A.S.T.M. requirement is difficult of attainment when using the customary two aggregate sizes, in his opinion. He pointed out that shrinkage is proportionate to the cement content, in emphasizing that added cement will not achieve the desired result. Rather, he said, correct grading along with low cement factor is the answer to a high strength, low absorption unit.

There was much controversy over the results obtained from the use of air-entraining agents and additives for quick-setting purposes. In discussing the use of calcium chloride, a number of producers commented upon its value in the acceleration of set and resulting early release of cored pallets while, in a few instances, producers expressed the opinion that a slightly heavier unit resulted. Some of the plasticizing additives in use apparently are of special benefit where the aggregate is short of extreme fines.

The subject of air-entraining agents, interground in the cement and added at the mixer was a live one, but from which no definite conclusions could be drawn. A representative of a

midwestern portland cement company commented that no air is entrained in the dry mixes in common use for block manufacture but, he said, the air-entraining agent acts as a lubricant for the fine aggregate in the mix, especially where vibration is employed in placing the concrete in the molds. A heavier unit, by from one to two pounds, results from the use of air-entraining agents, according to his observations.

A representative of a manufacturer of one of the common air-entraining agents said that there is air entrained in dry mixes although vibration processes result in some loss in the amount of entrained air. He said that a plasticized concrete results, with lower absorption and fewer culls.

A manufacturer of concrete units, who reported consistent absorption tests of less than 5 per cent with the use of air-entrainment, suggested that tests be made to determine how much air might be entrained in concrete units for best results. He contended that the figure should not be the same as is recommended for concrete pavement mixes and suggested as a possibility that two or three times greater air-entrainment might be desirable and obtainable by addition of the agent into the mixer. Another manufacturer of concrete units said that he was obtaining improved results, as measured by absorption, through addition of air-entraining agents in quantity exceeding the normally-recommended amount.

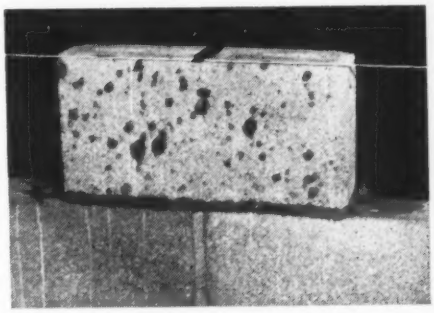
One producer, who has been actively experimenting with high temperature, accelerated curing, reported that, in drying following the steaming cycle, reduction in strength has accompanied the forcing of dry air through his kilns, proportionate to the length of time of drying.

The session concluded with an interchange of experiences the members have had with union organizations that are endeavoring to outlaw the standard size of unit in favor of smaller ones, in various parts of the country. The Association has been very active in such matters with very favorable results. Obviously, the masons will earn more money in the long run if they go along with the size of unit that the public considers most suitable and economical for its purpose in obtaining excellent construction from every standpoint.

Dick Carpenter, left, and Harvey Lee, of Anchor Concrete Products Co., Buffalo, N. Y.

## Lightweight Aggregates

AUSTIN CRABBS of Davenport, Iowa, presided over the Celocrete meeting. One of the problems discussed was the trouble that sometimes occurs when a car of aggregate left standing is subjected to continued rainfall. Difficulty is experienced in removing the aggregate from the cars, necessitating running through a crusher to break up the lumps and then rescreening. One user reported that the use of Celocrete had increased machine efficiency over cinders. Mr. Barnes described the very efficient high-temperature, high-humidity curing system of Barnes & Cone, Inc., Syracuse, N. Y., which was published in the January issue of ROCK PRODUCTS. H. J. Farr of Cleveland Builders Supply Co., Cleveland, Ohio, described the manufacturing process used by Cleveland Slag Co. to make Celocrete. The Cleveland Builders Supply Co. produced ten million concrete block in 1946. This



Metal masons liner gadget distributed by John Strandberg

company uses high temperature steam curing and provides for two to three weeks storage under cover.

Jack Hash, advertising manager of the Celocrete division, Celotex Corporation, followed with an interesting talk on promotional plans for Celocrete aggregates and products.

W. CHESTER SMITH of The Cooksville Co., Ltd., Toronto, Canada, led the discussion at the Haydite meeting. Considerable discussion developed around the subject of block texture. It was pointed out that the vibration principle in block manufacture had brought about a better texture in the finished block. On the question of waterproofing, considerable discussion developed. Several water-proofing agents were mentioned, but one member pointed out that waterproofing may defeat some of the desired insulating and acoustical qualities of the block. In the matter of aggregate sizes, it was suggested that the best practice was to use two separate sizes of aggregates, coarse and fine, and not a mixture. Another suggestion was to use a Haydite sand with the mortar to get the same density as the block. ED OLSEN of Oshkosh said that he was using a small amount of Darex with air-entraining cement to obtain a more plastic mix and one which would permit better handling of green block. Considerable discussion involved the possibility of resistance to high

C. J. Wilkerson talking with Ben. Wilk

prices holding up construction projects. Several present said that this condition was evident in their localities, but no marked falling off in business was anticipated.

A. G. STREBLOW of The Basalt Rock Co. was discussion leader at the Pumice section meeting. The question of absorption received a great deal of attention. It was brought out that there is about 12 to 13 lbs. per cubic foot absorption in pumice block. To insure that shrinkage will not develop between mortar joints and block, it was suggested that the best practice is to see that a properly cured and dry block is delivered to the building site and then see to it that it is protected from the elements so that there will not be excessive moisture absorbed from rain or snow. Considerable discussion developed over the use of Darex to cut down absorption. Some had used it successfully and others had reported that it was not so effective with a dry mix. However, it was pointed out that the question of aggregate gradation, kind of cement, and water content had much to do with the results. One user of pumice reported a gummy condition developing in the mix. It was brought out that this was probably due to excessive fines in the aggregate.

PAUL WOODWORTH of the Waylite Co., presided over the Waylite aggregate meeting. Discussion at this meeting revolved about the difficulties of obtaining sufficient Waylite to meet demands. Considerable improvement in deliveries are anticipated. Markets and production problems also were discussed.

## OPA Settlements

YAKIMA CEMENT PRODUCTS Co., and the Columbia Concrete Pipe Co., Yakima, Wash., have made out-of-court settlements with the OPA in Seattle. The OPA had brought suit against the Yakima Cement Products Co. for $59,832.90 and settlement was set at $3460.75. The Columbia Concrete Pipe Co. will pay $4046.55 instead of $69,980 sought originally by the OPA. Both suits involved treble damages. W. P. Hews, president of these companies, said that negotiations had involved several weeks.

## Open Sand Pit

HALL BROS., Marysville, Kans., have opened a new sand pit near this city.

# Hold Boom Markets By Selling Quality Products

## Wisconsin Concrete Products Association holds annual meeting at Madison, Wis., January 27-28

WITH 135 in attendance, the Wisconsin Concrete Products Association's 27th annual meeting at Madison, Wisconsin on January 27 and 28, was declared to be the best meeting in many years.

All through the meetings speakers stressed the need for production and delivery of only high quality units, and the necessity of aggressive merchandising methods in the promotion and sale of the products.

PRESIDENT GEORGE ANDREW'S address at the opening meeting described the strides made by the industry over the years and especially the present enviable position now held by the industry in the construction field. "What," Mr. Andrew asked, "can we as individual concrete masonry producers do to hold this unprecedented good market for our product?" In answer to this challenge he proposed a two point program as follows:

"First, we must awaken to a vigorous program of sound merchandising. By this I mean each as individuals must set up and carry out an intelligent and continuing sales program using personnel and methods that can compete with that of other products. This means a broad and continuing advertising program by each of us to sell the owner, builder, architect, and general public on the value of concrete masonry. You no doubt have undertaken small advertising and merchandising programs in the past. These must be expanded manifold and continued if we are to hold our market, let alone grow.

"Second, we must produce a better concrete masonry unit than in the past. By this I mean not only meeting the requirements of the State Industrial Commission as to strength and absorption, and the requirements of the buyer as to appearance, trueness and texture, (we have all met these in the past) but also we must take steps immediately to deliver a concrete unit than when placed in the wall will not produce cracks due to shrinkage. This means selling only dry blocks. We can accomplish this by forced drying in the manufacturing process or by air drying in yard storage. We owe it to ourselves as well as to our customers to deliver only dry blocks to the job. It doesn't cost much and will result in fewer headaches now as well as saving our market for the future."

Following reports of the secretary and treasurer R. E. COPELAND, director of engineering, National Concrete Masonry Association, discussed some of the many technical problems confronting the industry and told what steps the national organization is taking to solve them. This included studies being made of such questions as percentage of core space in block, uniform quality, use of control joints in masonry walls, reinforced concrete masonry and the use of concrete masonry units in floors.

WM. L. ROPER, agricultural engineer for the Portland Cement Association in Wisconsin, discussed "The Market for Concrete Masonry on Wisconsin Farms." Declaring that a vast potential market does really exist on the farms, Mr. Roper outlined a four-point program as to what the concrete masonry producer should do to get his share of it:

*1. Emphasize package farm buildings*

This is the way dairy plants are getting milk houses out to farmers—giving a complete building package price; including everything to hardware. This can't be overemphasized. It's the way the farmer buys most everything else: tractors and farm machinery, for example. A tractor salesman doesn't break down material and labor costs nor quote hourly rates on the assembly line when giving the farmer the selling price of the machine.

*2. Keep up sales promotion contacts*

Know the county agent, vocational agriculture teachers, state and local milk inspectors, dairy plant operators and fieldmen and know of their plans and problems concerning farm buildings. Emphasize planning of farm buildings to the customer. The planning of any building, no matter for what purpose it is intended, is just as important as the actual construction.

Wouldn't it be smart business to furnish the vocational agriculture teachers in your area with enough concrete block so their shop classes could lay up wall sections with weak mortar and then tear them down for further class work? Such teaching would give a lot of the farmers of tomorrow the "feel" of the trowel and confidence in themselves to tackle concrete masonry construction.

*3. Advertising*

It's a pretty good business practice to know where your products are going; i.e., what fields you are reaching and which ones haven't been touched. Incidentally, if all the concrete masonry units in farm buildings today are of such quality that they give a lifetime of service, that's the kind of advertising that really pays off in increased business not only now but in the future when the building material field will be more competitive.

*4. Literature distribution*

Right now is when farm folks have time to read and attend meetings, and therefore a good time to keep literature racks full in the office and an opportune time for direct mailings of literature on timely farm improvements such as covered in Portland Cement Association literature. Why not sponsor a farmer's day in cooperation with the county agent—make it a building clinic?

Mr. Roper concluded his remarks by describing the building plans recently prepared by the Portland Cement Association in cooperation with the College of Agriculture, University of Wisconsin. "Plans for Concrete Masonry Milk Houses" has been widely distributed throughout the state, but with an estimated 100,000 milk houses yet to be built there is unlimited opportunity for distributing more copies. A new planograph, "Plan for Combination Building" was prepared in 1946. It includes details for the construction of a concrete masonry building with a machine shed, poultry house, hog house, garage, granary, crib, and repair shop under one roof. The plan also includes notes on farmstead planning. "Such a plan should be in the hands of every Wisconsin farmer," Mr. Roper concluded. The showing of the new colored sound movie "Concrete on the Farm" produced by the Portland Cement Association ended the first day's session.

The second day of the meeting was featured by an actual demonstration of the determination of the moisture content of a concrete block. This was conducted by Prof. O. Neil Olson of Marquette University assisted by C. L. Stewart and C. W. Yoder of the Chicago and Milwaukee offices of the Portland Cement Association, respectively.

In an address on "Concrete Masonry for Farm Construction" Prof. Max J. LaRock, University of Wisconsin, stressed the importance of and need for farmstead planning. He showed slides illustrating various features of planning and construction of farm buildings and told of the urgent need for extensive use of concrete masonry in farm buildings. "The principal reason for the younger generation leaving the farm is that the buildings—barns, houses, etc., are antiquated and unsanitary," Prof. LaRock stated.

Possibly the most inspiring number on the program was an address entitled "Accentuate the Positive, Eliminate the Negative" delivered by Howell G. Evans, Vice-President, Hamilton Mfg. Co., Two Rivers, Wis. Mr. Evans held the audience practically spellbound for nearly an hour as he

discussed the important features of free enterprise. The positive points he urged his audience to accentuate were: quality, service, market knowledge, and growing men, each and everyone important to the concrete masonry manufacturers and salesmen. "Eliminate these negatives," Mr. Evans urged, "self-complacency, lack of vision, internal dissension, and procrastination."

Since no meeting of concrete masonry manufacturers would be quite complete without a few remarks from E. W. Dienhart, executive secretary, National Concrete Masonry Association, he delivered a short address as it was late in the day and the members were anxious to prepare for the banquet which was held that evening and turned out to be a very gala affair. Lt. Governor Oscar Rennebohn and Secretary of State Fred Zimmerman of Wisconsin, both former block manufacturers, made appropriate remarks.

## Merchandising

*(Continued from page 138)*

when operating at a loss. As expressed by Mr. Cleary, fifty-two 1-in. advertisements were much preferred to one 52-in. ad. The company advertises "Worthcrete" in the Fort Worth Star Telegram and "Dalcrete" in the Dallas News and recently has inaugurated a daily morning radio program over station WFAA in Fort Worth.

Radio merchandising is considered excellent because expert radio announcers add their personalities to the program and because it affords an opportunity for the vice-presidents of the company to become known and gain prestige through their appearances on the program.

Mr. Chase will spend $20,000 on advertising in 1947; $10,000 for newspapers, $5,000 for radio, $2,000 in the telephone directories and $3,000 in the distribution of pamphlets. He urges that companies print, not rubberstamp, their names on literature furnished by the P.C.A. or N.C.M.A.

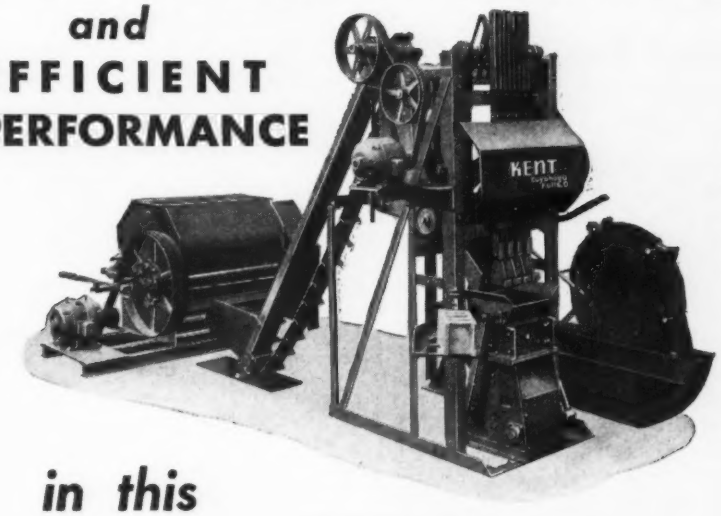
Cities Fuel and Supply Co., West Allis, Wis., is using sample homes at the Milwaukee Home Shows as a merchandising tool in selling Dox blocks and Colorstone units which feature mineral colors.

The Hurlbut Co., Green Bay, Wis., features a great number of unit sizes and shapes and merchandises a complete structure, using dealers to sell within a 150 mile radius. Factual promotional pamphlets are extremely useful.

Little Rock Lumber and Material Co., Alma, Mich., is gaining wide publicity through granting a scholarship at Alma College for the best essay on the subject "Why I Prefer Homes of Cinder Block."

Bethayres Concrete Products Co., Bethayres, Penn., advertises that the 3500 concrete homes it has built have fewer cracks than any other type of home. The company expects to build


**CENTER RESPONSIBILITY**
***for All Related Machinery***
***and***
**EFFICIENT PERFORMANCE**




***in this***
**COMPLETE KENT PLANT**

Purchase of this complete Kent block plant assures satisfactory performance. Each unit was designed to operate efficiently with all other machines making a well balanced, dependable and economical operating plant.

It is relatively compact in size and requires only a simple and inexpensive building. The investment outlay is nominal in proportion to profit possibilities.

Each unit reflects sound and practical knowledge based upon Kent's long, specialized experience. Refinements include the use of ball and roller bearings in the important shafts assuring longer and more satisfactory service.

This plant will produce 1000 or more blocks per eight hour day. Singly it has proved to be an excellent outfit for setting up in business. Batteries of them are proving highly satisfactory in the large plants. Available with batch mixer as shown or the famous Kent Continuous Mixer.

*Get complete information*

The KENT MACHINE COMPANY
*Manufacturers of* CONCRETE PRODUCTS MACHINERY *Since 1925*
CUYAHOGA FALLS, OHIO, U.S.A.

C. P.

**Send complete information and prices as checked below.**

☐ Plant illustrated above ☐ Plant with Batch Mixer
☐ Plant with belt drive ☐ Larger Complete Plants
☐ Complete Set of Block Machinery Literature

**Name**..... **Address**.....

**City** .....

# FASTER CUTTING ...with Clipper Masonry Saws

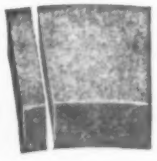
**Your Special Size and Shape Brick or Concrete Block can now be "Tailor-Made" at a moment's notice!**

**The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.**

**Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.**

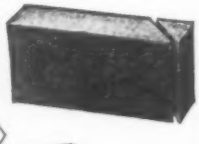
**This concrete block, converted into a special size, was cut completely in two in 19 seconds.**

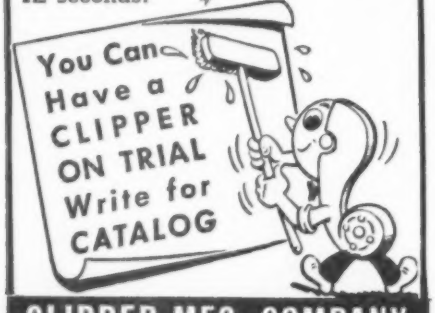
**One of the many intricate cuts performed on first quality clay brick for heat treating furnaces —made in 8 sec.**



**Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.**

**Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!**






**CLIPPER MFG. COMPANY**
Warwick at 28th, Kansas City 8, Mo.

Mr. Kay of Basalt Rock Co.

between 1000 and 2000 concrete houses in 1947, cooperating with 20 developers.

Graystone Concrete Products Co., Seatle, Wash., employs an advertising agency and publishes the "Graystone Builder" for distribution to a selected list of prospects. The company is represented in all building organizations in its area.

Black-Brollier, Inc., Houston, Texas, located in a strong clay brick area, is spending $1250 per month advertising in newspapers, over the radio and in a direct mail campaign.

Plasticrete Corp., Hamden, Conn., offers a ten per cent discount to dealers and handles 75 per cent of total sales through these dealers' merchandising activities of this most aggressive concern have been described in recent isues of ROCK PRODUCTS (See December, 1944, pg. 115).

Mr. Cleary concluded by showing slides of typical advertisements used and with a presentation of a broadcast of a typical complete radio program of Chase Building Products.

The convention sessions concluded with a colored slide presentation "A Scotsman Looks at Modular Coordination," depicting the wastage in materials and labor when uncoordinated sizes of building materials are used as compared to the simplicity and savings affected by modular coordination.

# CONCRETE PRODUCTS NEWS

CERTIFIED CONCRETE PRODUCTS, INC., S. Glens Falls, N. Y., has been organized to conduct the business of building docks, sidewalks, roadways, buildings, and all kinds of structures made of concrete. Capital is 200 shares of stock, no par value. Subscribers and directors are Bernard A. Sternberg, Bernard N. Grossman, Glens Falls, and Marcia Tarty, Brooklyn.

ALFRED STRONG AND SONS, Lacon, Ill., have started a concrete block plant that will produce 1000 block per day.

LINDBERG CONSTRUCTION CO. is building a plant in Jamestown, N. D., for the production of concrete block.

GEORGE H. MEYER AND GLENN S. STANNARD, Elkader, Iowa, are producing concrete block and other concrete products at the rate of 240 block per hour.

THOMAS LEVARDI AND CARL R. MOSEGARD are operating a concrete block plant in Hinsdale, Mass.

KOST BROTHERS, Moorhead, Minn., producers of sand and gravel and ready mixed concrete and manufacturers of concrete block and other concrete products, has been incorporated by John L. Kost, Anton Kost and Adolph Kost.

NORTHWEST CONCRETE PRODUCTS CO., St. Cloud, Minn., has been incorporated to deal in concrete products and building materials. Incorporators are Leon H. Schlough, Wesley E. Schlough and Richard N. Wilcox.

CONCRETE PRODUCTS CO., Iowa Falls, Iowa, has been established by Gene Baldwin and Luke Altfillisch for the production of concrete block. Capacity of the plant is 1400 block per day.

LIMA CEMENT PRODUCTS CO., Lima, Ohio, has been incorporated but will continue to operate on its former basis. Capital is 500 shares of stock. Officers are J. O. Ebling, president; William H. Ebling, vice-president; and Mrs. Luella Ebling, secretary-treasurer.

SMICKSBURG BLOCK CO., Smicksburg, Penn., is manufacturing concrete block at the rate of 500 per day and is equipped to produce 1600 units daily. Officers are Lex M. Neal, president; John J. Troutman, secretary, and William J. Stiteler, treasurer.

WILLARD WEBSTER AND STEPHEN WESTDAL have announced the formation of a new concern known as the Concrete Masonry Products Co., Williston, N. D., to manufacture concrete building block. Capacity of the plant will be 1200 to 1500 block per day.

LAKE CITY CONCRETE PRODUCTS CO., Lake City, Minn., has started the manufacture of concrete block. Capacity of the plant is 1000 block per day.

L. W. RHOADS, who has been in partnership with V. W. Thompson in operating the Carlton County Concrete Block Co., Barnum, Minn., has purchased the interest held by Mr. Thompson, assuming complete ownership of the business.

STEWART-NATTINGER CONCRETE BLOCK & BRICK CO., Clinton, Mo., is opening a new block plant in Springfield, Mo. Jack Stewart will supervise the new plant.

COLBY CEMENT PRODUCTS CO., Colby, Kans., has started the production of concrete block and is planning to erect a new plant. Capacity of the plant will be 1000 block per day. Wil-

liam D. Beeby, Patrick A. Beeby and James R. Herzberger, all of Topeka, Kans., are the owners.

SUPERIOR CEMENT WORKS, Superior, Wis., is the name of a new concrete block plant which Walter A. Bebo of Duluth, Minn., is planning to build in Superior. Capacity of the plant will be 1000 block per day.

SAN JOAQUIN HAYDITE CONCRETE PRODUCTS Co., Selma, Calif., has started the manufacture of haydite concrete block and brick. William A. Grindle and Clifford W. Tinker, veterans, are the owners.

SYG SUSAG has started the manufacture of concrete block and other concrete products in Crosby, N. D. Capacity of the plant is 180 block per hour.

SAUK CENTRE CONCRETE PRODUCTS, Sauk Centre, Minn., has started producing concrete block and plans later to include concrete silo staves and other concrete products. Capacity of the plant is 1000 block per day. Chester and Roman Gilyard, formerly of St. Cloud, Minn., are the owners.

BLACK HAWK BRIC-BLOCK CORP., Waterloo, Iowa, capitalized at $25,000, has filed articles of incorporation to engage in the manufacture and sale of concrete block and other building products. Officers are Louis Goldman, Waterloo, president; Jerome Bloom, Minneapolis, Minn., vice-president, and Fred Arend, Waterloo, secretary-treasurer.

ZEIDLER CONCRETE PRODUCTS Co., Waterloo, Iowa, has started a concrete drain tile plant in Clear Lake, Iowa. Albert Schultz is manager of the plant which produces tile up to 10 in. in diameter. The plant at Waterloo turns out tile of any diameter. Carl Bluedorn is president and general manager of the company.

ATLAS CONCRETE PRODUCTS, INC., formerly the Walker-Myers Co., has started production of concrete block, employing a Kent tamper, and is making 500 block per day.

JOHN V. DRUMMOND has received authorization from the Civilian Production Administration to construct a $50,000 concrete products plant in Maryland. The plant will have a weekly production of 20,000 ft. of concrete drain pipe and soil pipe. It will be the first unit of a $1,000,000 concrete products plant which will have an ultimate weekly output of more than 100,000 ft. of drain and soil pipe.

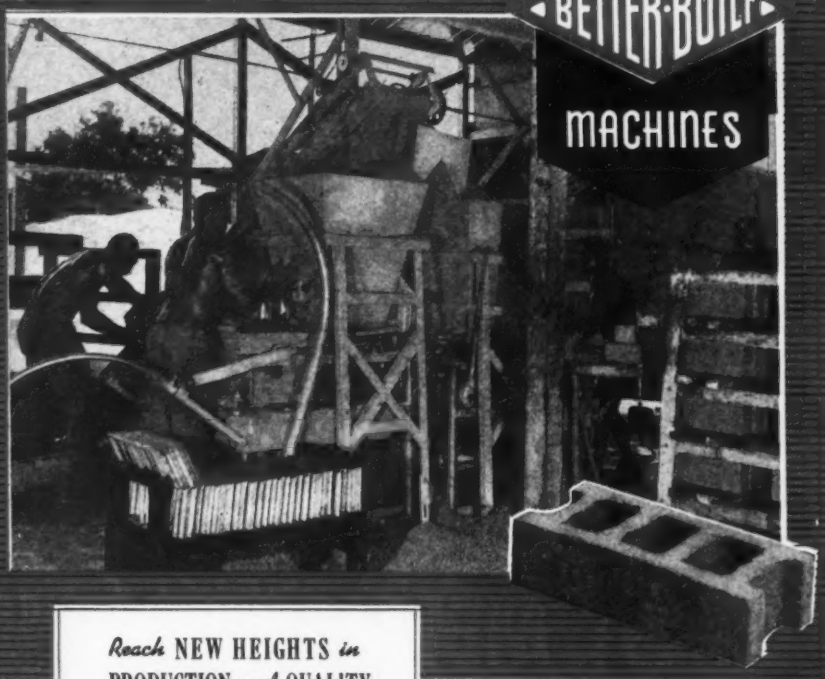
PORTAGE CONCRETE BLOCK Co., Port Clinton, Ohio, is manufacturing concrete block at the rate of six block per minute. Harold Jeremy and Edward Sztuk are the owners.

MISSOURI CONCRETE PRODUCTS & BUILDING SUPPLIES, INC., Columbia, Mo., has purchased at Helena, Ark.,

*(Continued on page 151)*


Cornerstone of Success

GRAVELEY BETTER-BUILT MACHINES

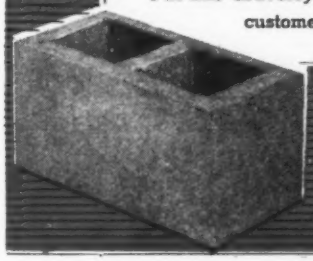


*Reach* NEW HEIGHTS *in* PRODUCTION *and* QUALITY

Operators old and new are stepping up production and improving the quality of their blocks and increasing profits thru Graveley "Better Built" Concrete Block Machines.

Put a Graveley to work for you. One machine makes eight sizes of blocks, a truly versatile, practical money-making machine. There are two models, a 2-cell and a 3-cell, both two unit jobs. Two Graveley machines operating from a single mixer and conveyor will produce well over 3,200 blocks a day.

*Put this Graveley job to work for you.* Provide for every possible customer demand in both style and size range of block.

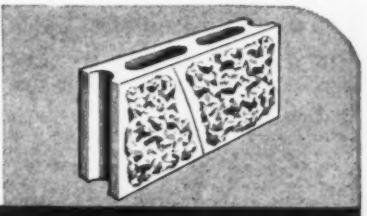


BOB GRAVELEY INDUSTRIES, Inc.
ORLANDO, FLORIDA

GRAVELEY BETTER-BUILT MACHINERY

**STONE FACED BUILDING BLOCK!**
**Protect Your Future!**

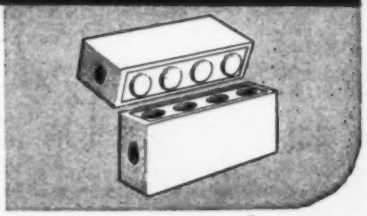
A new development that brings the heretofore expensive stone house within the reach of thousands. Stone is embedded in the block. Beautiful construction. Low cost molds and simple manufacturing process. Territorial agreements now being made. Write, phone or wire for descriptive literature.



DELAWARE INDUSTRIES Inc. Muncie, Indiana

**INTERLOCKING BUILDING BLOCK**
**Add these profit makers!**

LAY-MORE BLOCK MACHINES use compressed air process to manufacture a four inch concrete building unit. Cavity wall construction. Knobs and cups are firmly interlocked with pure cement bond. Low cost Machines. Write for descriptive literature.



# Hard-faced mixer blades last SIX TIMES LONGER

Under the severe abrasion and impact experienced in processing aggregate, the blades of the above batch mixer in one mid-western plant wore out in 3 months. Often the blades had to be replaced in 2½ months.

To curb this costly maintenance and to end the equally serious loss of production caused by shut-downs while the new blades were installed, Coast Metals hard-facing was put to work. Blades now last *6 times longer.* And, eventually, when a blade does wear away, it is recoated and made *good as new* at a fraction of the new blade cost.

**Coast Metals will likewise prolong the life of your batch mixer blades, cinder crushers, tamper feet and other parts exposed to severe abrasion and wear. Write for Bulletin No. R-1001!**

COAST METALS, INC.
*Plant and General Offices:* Canton, Ohio
*Executive Offices:* New York, N.Y.

**COAST METALS** *hard-facing*
RESISTS WEAR, SAVES REPAIR

## "ANCHOR"

***Complete***

**EQUIPMENT AND ENGINEERING SERVICE**

Equipment for all phases of manufacturing concrete cinder block and other lightweight aggregate units. Our engineering service for new plants and modernizing old ones will help you operate more economically.

Stearns Clipper Stripper Machines; Stearns Joltcrete Machines; Stearns Mixers; Cast Iron and Press Steel pallets. Straublox Oscillating Attachments, etc.

Repair parts for: Anchor, Stearns, Blystone Mixers and many others.

**Anchor Concrete Mchy. Co.**

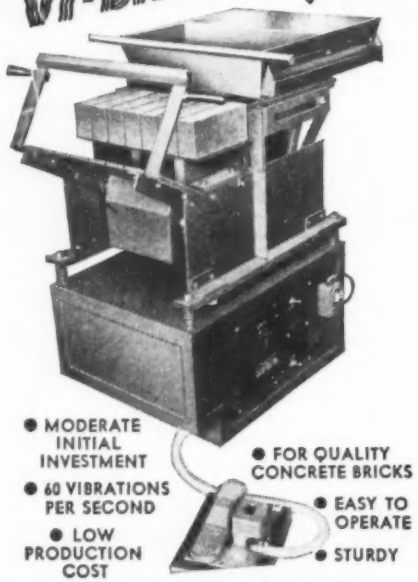
1191 Fairview Ave., Columbus 8, Ohio



PRODUCES
**28 BRICKS PER MINUTE**

**VI-BRIK-CRETE**

NEW HOPPER SPEEDS MOLDING



- MODERATE INITIAL INVESTMENT
- 60 VIBRATIONS PER SECOND
- LOW PRODUCTION COST
- FOR QUALITY CONCRETE BRICKS
- EASY TO OPERATE
- STURDY

ALSO MANUFACTURERS OF THE
**LITTLE DAVE** *BRICKMAKER*
LOW COST HAND OPERATED MACHINE

**R.S. Reed Corporation**

310 EAST HOFFMAN ST.
THREE RIVERS, MICHIGAN


## Hard Facing Welding

*(Continued from page 137)*

facing material for the intended service, etc. The services of hard-facing welding engineers are available from the suppliers and manufacturers of hard-facing welding rods.

"Manufacturers of cement products plant machinery have, in general, been slow to adopt hard-facing methods in designing machine parts subject to wear. This is not due to their lack of acceptance of the fact that hard-faced parts are more durable, but, mainly, to the slightly increased cost of hard-faced parts, and to a very competitive, price conscious buyers' market. Consequently most of the uses for hard-facing materials now common in the concrete products industry have been originated by plant operators dissatisfied with the performance of original equipment parts. These applications have proved to be an effective means of reducing replacement part inventories as well as the down-time of high production equipment. Therefore the hard-facing of new and worn parts in the maintenance shops of individual plants is entirely practical and is not limited to specialized use by large manufacturers or commercial welding shops.

"Hard-facing metals are used both for coating new parts before installation, and for salvaging and reclaiming worn parts. Where it is necessary to allow for the clearance of the parts they should be made up undersized to accommodate the hard-facing overlay. Grinding or dressing the hard-facing deposit is generally unnecessary unless service conditions require a smooth surface. Parts worn more than ¼ in. should be rebuilt nearly to their original dimensions with inexpensive welding electrodes of a suitable analysis and finished with a final overlay of hard-facing metal.

"During the initial years of operation our mixer blades were replaced at the rate of four sets per year on a working day average of 16 hrs. The cost of these changes were $400 per mixer, per year, for blades and labor of changing.

"At present in order to cut our maintenance figure we have used Coast Metal, hard-faced welding rods on our Stearns 42 cu. ft. mixer blades. The cost of these blades is $80 per set. It requires 60 lbs. of the rod at $2.00 per lb. totaling $120, which is added to the original price of the blades. The labor for welding is $37.50 for 30 hours' work. The installation cost is $15.00. Therefore, the total cost of the entire conversion is $252.50.

"In this instance, we have saved $133 per set of blades, per mixer, per year. We have four mixers in operation; therefore, we have saved four times the $133 or $533 for the total year's production. We also have hard-faced one set of mixer door liner bars. This set of liners has been in service for six months and has already out-

lived three new sets of ordinary door liners. There are no price figures on the new application as yet. Our Company is sold on the use of hard-facing material for all uses when extreme wear causes expense and trouble, and to date we have realized a substantial saving."

## Concrete Products News

*(Continued from page 149)*

a complete ready mixed concrete plant which is being dismantled for shipment to Columbia. The corporation, which issued $15,000 in stock when it was formed, plans to increase its capital stock to $100,000.

NORTHWEST CONCRETE PRODUCTS Co., Lynden, Wash., which specializes in the manufacture of concrete stave silos, has been purchased by H. J. Van Dyke.

KOST BROS., INC., Moorhead, Minn., has been incorporated by John L. Kost, Anton Kost and Adolph Kost, for the purpose of manufacturing, buying and selling cement, concrete products, buying and selling all kinds of merchandise, operating garages and repair shops, operating a ready mixed concrete plant, etc.

BUCKEYE CEMENT PRODUCTS Co., Springfield, Ohio, has been incorporated by J. W. Brunk, G. H. Brunk and S. E. Brunk, with a capital of 250 shares of stock, no par value.

KENNETH C. GOODNIGHT is now the sole owner of the Carrollton Material Co., Carrollton, Mo.

J. C. DILLON, JR., and C. S. DILLON have purchased the limestone and cinder block plant in Avis, W. Va., from Howard Bugg, Jr. Capacity of the plant is 1000 block per day.

T. J. BRETTO CONCRETE PRODUCTS Co. has begun production of concrete block in Coal City, Ill. Thomas Bretto, returned veteran, is the owner.

MARVEL ANDERSON is planning to open a concrete brick plant in Alta, Iowa, under the name of Marvel Dunbrik Co. Capacity of the plant will be 10,000 brick per day.

ALBERT AND JAMES STOICK are planing to open a concrete block and brick plant in McIntosh, S. D.

LEO DUSTER has purchased the concrete block plant from J. A. Mathey in LeMars, Iowa, and has taken over operation of the plant. Concrete block produced at the plant will continue to be sold under the Mathey trade name.

LAY RITE PRODUCTS Co., Billings, Mont., has been incorporated with a capital stock of $100,000 and will engage in the manufacture of a special type of concrete block and other concrete products. Incorporators are L. R. Hines, Fred Sickmiller and P. J. McKay.

ANDREW J. BAKER, JR., owner of the Superior Concrete Products Co., Columbia, Mo., announces that his new plant on Highway 40 is now open for business and turning out 500 concrete block per day. Mr. Baker, a veteran of two years in the merchant marine,

*(Continued on page 152)*


# truck-man does a JOB!

***Ask Any Operator!*** Gasoline power and hydraulic lift take the sweat out of handling in this busy industry.

TRUCK-MAN'S other BIG FEATURES will do the same efficient job for you. HERE'S HOW:

- Lifts and hustles skidded capacity loads—quickly, safely, without starting or dropping shocks . . .
- Turns in 360°—snakes into holes its own length—increases your usable space . . .
- Handles without body movement. Grouped controls speed operation, cut fatigue . . .
- Speeds briskly on straightaways—creeps in narrow quarters and close squeezes . . .
- Drives on big DUAL pneumatic-tired wheels for traction and easy riding. Solids carry the load . . .
- Stands the gaff—tireless, day in, day out! TRUCK-MAN is EASY TO BUY, ECONOMICAL to operate . . .

**$775.00** F. O. B. JACKSON

IF TIME AND MONEY MEAN ANYTHING TO YOU, TRUCK-MAN welcomes your inquiry and investigation. Write now for descriptive bulletin. Limited open territory for substantial distributors.

*a product of*

**truck-man INC.**

1413 West Ganson, Jackson, Mich.

---

*Write for Information*

**IDENTIFY Your BLOCK**

**By Simply Pushing a Button**

# GEISTENCIL

**Patented**

**Automatic — No Labor Cost**
**Available for Vibrapac or Joltcrete Machines**

- ★ Brands' Name, Date Trademark
- ★ Identification Assures Quality
- ★ Shows Pride of Manufacturer
- ★ Visible From a Distance
- ★ Merchandise Your Product

**GEISTENCIL**

**GEIST BROS. • 3540 Ridge Road • Cleveland 2, Ohio**

PUTS PROFIT IN YOUR POCKET—

# BIG OPPORTUNITY

## BUILDING BLOCKS of CONCRETE CINDERS

Men of Vision and Modest Capital See Prosperity and Independence in This Big Field Today. Read Offering Below and Then Mail Coupon.

NEEDED EVERYWHERE for Every Kind of Building to be Done

## BIG DEMAND FOR QUALITY BLOCKS - BIG PROFITS

Yes, here's a manufacturing opportunity never before equaled. Our complete concrete block unit consists of mixer, material elevator, hopper and famous proven Blocker Vibrator Machine. Turns out 130 blocks an hour. Needs only 3 people to operate. This unit has been paying for itself in six months so IT PAYS FOR ITSELF QUICKLY—and from then on you KEEP FULL PROFITS. One user says:

"We are operating your machine at Junction City. Easy to maintain production of ONE HUNDRED CONCRETE BLOCKS PER HOUR PER MACHINE—often producing as high as one hundred thirty units per hour. Your Blocker Vibrator has no complicated parts. We recommend your product as a REAL practical MONEY MAKER."—Concrete Products Co. of Junction City.

Limited amount at special price to get these operating in many different localities at once. RUSH COUPON for money making facts and details about our unit—DO IT NOW.

**MAIL COUPON for DETAILS!**

Concrete Block Equipment Co., Inc.
920 Central, Dept. 110 Kansas City 6, Mo.

Please send me details and "How to Start and Operate a Concrete and Cinder Block Plant—a New Local Business Rich in Opportunity."

*Name* .....

*Address* .....

**CONCRETE BLOCK EQUIPMENT CO., INC.**
920 CENTRAL, DEPT. 110
KANSAS CITY 6, MO.


## Concrete Products News

*(Continued from page 151)*

is assisted by his father, A. J. Baker, Sr., as manager, and Joehart Lowell as engineer.

CONCRETE PRODUCTS CO., Arkansas City, Kans., owned and operated by Marshall Morris, has started production of concrete block.

COMSTOCK CEMENT PRODUCTS, Kalamazoo, Mich., is the name of a new company producing concrete block and other concrete products. Charles F. Bowers, returned veteran, is the owner.

WALTER GESFORD and E. B. WEAVER, returned veterans, are partners in a concrete products plant recently organized in Eagle Harbor, Wash., and will deal in concrete and gravel and similar construction work.

SWEET SPRINGS BUILDING BLOCK CO., Sweet Springs, Mo., has started the manufacture of concrete block. Ralph Wallace is manager of the plant.

NORTH IOWA BRIC-BLOCK CORP., Nashua, Iowa, has been incorporated at $25,000 for the production of concrete block in six colors, including red, yellow and a white brick made from white sand and with a glazed finish. John R. Cronin is president; Jerome Bloom, vice-president; R. J. Bennett, secretary-treasurer; Abraham Bloom, fourth member of the board. Completion of the plant is expected by January 1.

BELOIT CORNERS BLOCK CO., West Allis, Wis., is manufacturing a colored concrete block which is said to have a permanent waterproof facing. Anton and Barnard Tabat and Russell Rothe are partners in the firm.

PETE NEITZKE and ROGER HAMILTON, returned veterans, have established a concrete block plant in Detroit Lakes, Minn., under the name of Detroit Lakes Brick Co.

J. H. BERDINE and LEE MILLER have started a concrete block plant in Elmcreek, Nebr.

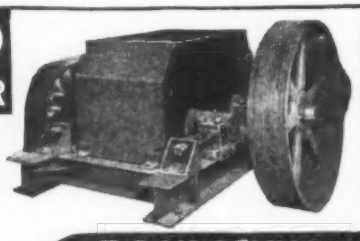
CUNNINGHAM CONCRETE PRODUCTS CO., Houston, Texas, has started making concrete block. Owners of the plant are Lloyd and Clyde Cunningham.

RORERT A. ANDERSON of New Phila-


**BONDED CINDER CRUSHER**

*The Better Buy!*

Complete, efficient crushing in ONE operation for block making. Hundreds of satisfied users in U. S. and Canada report low operating and maintenance costs. Free descriptive folder. Write, wire or phone — Garfield 5712 or University 2832 evenings.



*7 DAY DELIVERY*

| 10 to 20 ton per hour capacity | 25 to 50 ton per hour capacity |
|---|---|
| $345. | $795. |

**BONDED SCALE COMPANY** 1101 BELLVIEW AVE. COLUMBUS 7, OHIO

MANUFACTURERS OF SCALES, CRUSHERS, CONVEYORS, VIBRATING SCREENS

**Manufacturing MORTARLESS Interlocking Concrete Blocks**

PATENTED

Interlocking Units lay up perfectly without mortar. "Approved by Uniform Bldg. Code." Use unskilled labor and save money.

- *Exclusive Territorial Franchise Protects You*

*Get the Facts Today!*

Mortarless Tile Machine Co., Inc.

2623 Riverside Drive Los Angeles 26, Calif.

delphia, Ohio, is planning to build a concrete block plant in Navarre, Ohio.

EAST END COAL & CEMENT PRODUCTS Co., Winona, Minn., has been incorporated to engage in the manufacture and sale of concrete products and other building material and equipment. Incorporators are C. B. O'Brien, George J. White, and H. P. Joswick.

DEAN DELEHANT and EVERETT WARFORD have purchased the concrete block plant from the Charles Children Co., Council Bluffs, Iowa, and are planning to install new machinery.

CONCRETE MASONRY CORP. has purchased property in Elyria, Ohio, and will erect a concrete products plant at a cost of $100,000. Owners are T. L. Goudvis and Alfred G. Hoel, Jr.

PERU CEMENT BUILDING PRODUCTS Co. announces that its new concrete products plant in Peru, Ill., will be in operation by January 1. Production at the plant is expected to reach 30,000 colored brick per day. Other products include concrete joists and block.

PHIL AND A. N. MCCRARY have formed a partnership in establishing a concrete block plant in Altamont, Kans. Capacity of the plant is 800 block per day.

HARVEY BLOCK & TILE Co., Harvey, N. D., has moved into a new 100- x 40-ft. building for the production of concrete brick and block.

TIRO CONCRETE BLOCK Co., Tiro, Ohio, has started producing concrete block. K. C. Wagner and Hugh Pfleiderer are the owners. Capacity of the plant is 1000 block per day.

RUSSELL HENDRICKSON is building a new concrete block plant in Randall, Minn.

KENNETH B. ALLEN of Chittenango, N. Y., has installed a new steam curing plant for the manufacture of concrete block.

WILLIAM D. SMITH, of Tri-State Ruling & Binding Co., Memphis, Tenn., is planning to build a concrete block plant.

DIETERMAN BROS., INC., Kalamazoo, Mich., has been organized with a capital of $50,000 to manufacture and sell concrete block and concrete products. John Oosterbaan, Kalamazoo, is the agent.

P. H. FELIX AND HARRY SWARM, both of Portland, Ore., have started a concrete block plant in Vernonia, Ore.

## New Officers

AT THE RECENT MEETING of the Sand-Lime Brick Association, Carl Miller of the Pacific Brick Co., Pacific, Mo., was elected president. J. Morley Zander of the Saginaw Brick Co., Saginaw, Mich., was reelected secretary-treasurer; John Ryan, Ryan Fuel and Supply Co., Windsor, Ontario, Canada, was named vice-president, and Elmer Coates, Ralph Cromis, Jackson W. Van Brunt were elected to the executive committee which will determine the time and place of the next meeting of the Association. Twenty-five companies were represented at the meeting.


# For air entrained concrete

*use...*

**DAREX AEA**

Gives controlled air. Improved plasticity and placeability. Saves fine aggregate. Versatile as only one cement bin needed. Comes ready to use. Easy to use. Inexpensive proportioners obtainable. Convenient distributor stocks available nationally.

**DEWEY AND ALMY CHEMICAL COMPANY**
CAMBRIDGE 40, MASSACHUSETTS

SEND FOR FREE BOOKLET

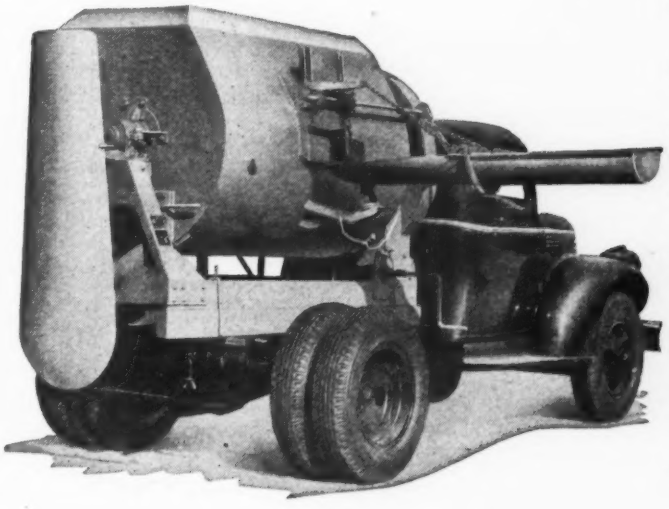
*Please send free booklet on AEA*

NAME _____

ADDRESS _____

ANNOUNCING the NEW **HIGH DISCHARGE**

*Transport* **TRUCK MIXER**

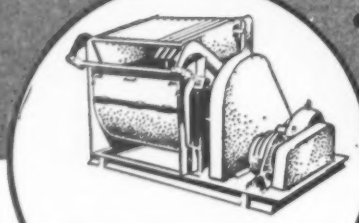


- ★ FAST OPEN TOP CHARGING
- ★ FULL VIEW INSPECTION
- ★ SUPERIOR MIXING PRINCIPLE
- ★ INSURES QUALITY CONCRETE
- ★ ALL STEEL CONSTRUCTION
- ★ LOW MAINTENANCE
- ★ ALL BEARINGS FULLY PROTECTED
- ★ GOOD DELIVERY

PHONE, WRITE, OR WIRE FOR DETAILS . . . DELMAR 3900

**CONCRETE TRANSPORT MIXER COMPANY, INC.**

4985 FYLER AVE. ST. LOUIS 9, MISSOURI



12 CU. FT. CEMENT MIXER

**Stephen Flam, Inc.**
15026 OXNARD ST., VAN NUYS, CALIF.

***AVAILABLE NOW!***

Rugged—Dependable—Block machine. Simplified for use by the average man for greatest block production per man hour. Easy to produce 2500-8"x 8"x 16" blocks in eight hours. A trouble free—compact unit.



# FREE SERVICE *for BUYERS*

**Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this page to us, and we will take care of the rest.**

TEAR OFF HERE

....Admixtures, Aggregate
....Aftercoolers, Air
....Aggregates (special)
....Air Compressors
....Air Separators
....Asphalt Mixing Plants
....Bagging Machines
....Bags
....Barges
....Batchers
....Belting, Conveyor, Elevator, Power Transmission
....Belting, V-Type
....Belt Repair Equipment
....Bin Level Indicators
....Bins and Batching Equipment
....Blasting Supplies
....Block Machines, Concrete Building
....Bodies, Trailer
....Brick Machines and Molds
....Buckets
....Bulldozers
....Cars, Industrial
....Classifiers
....Clutches
....Coal Pulverizing Equipment
....Concentrating Tables
....Concrete Mixers
....Concrete Mixing Plants
....Concrete Specialty Molds
....Concrete Waterproofing and Dampproofing
....Conveyors
....Coolers
....Cranes
....Crushers
....Derricks
....Dewatering Equipment, Sand
....Diesel Engines
....Dragline Cableway Excavators
....Draglines
....Dredge Pumps
....Drilling Accessories
....Drills
....Dryers
....Dust Collecting Equipment & Supplies
....Electric Motors
....Engineering Service, Consulting and Designing
....Explosives & Dynamite
....Fans and Blowers
....Flotation Equipment
....Gasoline Engines
....Gear Reducers
....Generator Sets
....Grinding Media,
....Gypsum Plant Machinery
....Hard Surfacing Materials
....Hoists
....Hoppers
....Kilns: Rotary, Shaft, Vertical
....Locomotives
....Lubricants
....Mills
....Pulverizers
....Pumps
....Scales
....Screen Cloth
....Screens
....Scrubbers: Crushed Stone, Gravel
....Shovels, Power
....Speed Reducers
....Tanks, Storage
....Tractors
....Trucks, Industrial
....Trucks, Mixer Body
....Trucks, Motor
....Vibrators
....Welding & Cutting Equipment
....Winches
....Wire Rope

**If equipment you are in market for is not listed above, write it in the space below.**

_____

_____

_____

**Send to:**

**Research Service Department**
**ROCK PRODUCTS**
**309 W. Jackson Blvd. • Chicago 6, Illinois**

**Your Name**..... **Title**.....

**Firm Name**.....

**Street** .....

**City**..... **State**.....